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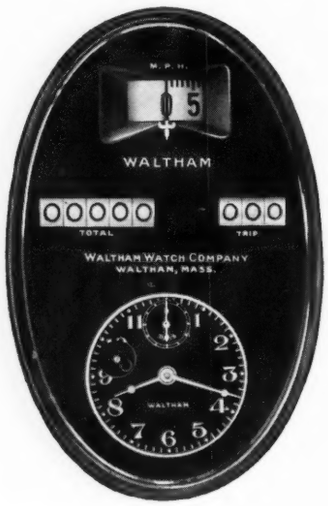

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLV. NEW YORK—THURSDAY, AUGUST 11, 1921 No. 6

Why Our Motor Fuel Supply Must Be Conserved

Half of our original domestic reserve is already consumed. Over one-fourth of last year's requirements were imported from Mexico. Economy in the use of remaining supplies is of the utmost importance.

By Herbert Chase

A WELL-KNOWN quotation might well be paraphrased to read "in time of plenty prepare for drought." As applied to the motor fuel situation this is no jest. The price of gasoline is down almost to pre-war levels. At the moment this may seem to be a good thing for the automotive industry, but there is good reason to question the apparent benefit if the effect of the future is taken into consideration. Low prices brought about by overproduction are apt to encourage careless use, and what is more important, discourage attempts to increase economy or to provide substitutes which in this case would add to the total supply of motor fuel available.

In times of drought there are always some drinkables available. So will there always be motor fuel. During the year 1920 nearly 450 million barrels of crude petroleum were produced in this country. If production could continue at this rate it is estimated that domestic reserves would be exhausted in about thirteen years. **That does not mean that there will be no gasoline, or its equivalent, available in this country thirteen years hence. Far from it.** Some domestic petroleum wells will no doubt still be yielding oil after the close of the present century and thousands of new wells will yield valuable fuel between that time and this.

Let no one rashly conclude that an industry so basically sound as that which supplies automotive transportation for the great nations of the world will disappear simply for lack of petroleum resources upon which to feed. On the other hand, no competent person who has thoroughly and conscientiously studied the facts can deny that all forms of petroleum will become more scarce and consequently much more expensive well within the next decade.

Having read thus far, someone will doubtless remark, "Old stuff. We have heard this talk of a motor fuel scarcity for several years, and there is still plenty of gasoline to be had. Why worry?" To which we reply, "Don't worry, but give heed to the facts—facts which are even more apparent than they were when they first began to attract attention."

Then what are the facts?

We have endeavored to make some of them clear in the accompanying chart, Fig. 1. It will be seen that **on January 1 of this year nearly half of the estimated total original supply of crude petroleum of this country, amounting to about 11.4 billion barrels, had been consumed.** Of this amount nearly 15 per cent was used during the calendar years 1919 and 1920 alone.

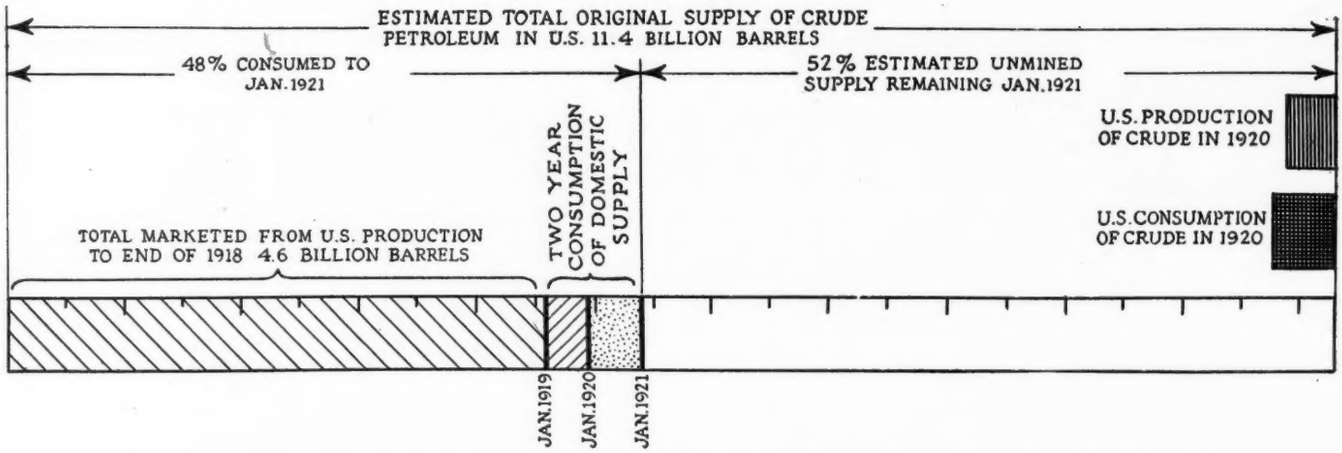
ESTIMATED TOTAL ORIGINAL SUPPLY OF CRUDE PETROLEUM IN U.S. 11.4 BILLION BARRELS
48% CONSUMED TO JAN.1921
52% ESTIMATED UNMINED SUPPLY REMAINING JAN.1921
U.S. PRODUCTION OF CRUDE IN 1920
U.S. CONSUMPTION OF CRUDE IN 1920
TWO YEAR CONSUMPTION OF DOMESTIC SUPPLY
TOTAL MARKETED FROM U.S. PRODUCTION TO END OF 1918 4.6 BILLION BARRELS
JAN.1919
JAN.1920
JAN.1921

Fig. 1—Chart showing relation between estimated original supply of crude petroleum in U. S., production to date and consumption last year. Compare the white block showing remaining supply with the amount produced last year.

The small block marked "U. S. production of crude in 1920" is drawn to the same scale as the block showing total original reserve. It should be compared with the block representing the unmined supply remaining in January, 1921, which is about thirteen times larger.

If it were possible to maintain last year's rate of production for the next thirteen years our entire supply of crude would be extracted from the earth by the end of that period. It is certain that this will not happen, but it is equally certain that the price of crude will mount and that all petroleum products will also increase in price as the domestic supply approaches exhaustion. This, in turn, will result in strenuous efforts to use all petroleum products to greater advantage. Many such efforts are now being made. It is to be hoped that they will be redoubled.

The second small detached block, marked on the chart "U. S. consumption of crude in 1920," is significant partly because of its size in relation to the block marked "U. S. production in 1920," referred to above.

It is clear that our domestic consumption of petroleum is much in excess of our domestic production, a situation which has now existed for several years. Last year there were consumed in this country 531 million barrels of crude as against a production of 443 million barrels. The difference was made up by imports from Mexico which were more than double the imports of the preceding year. Had there been no Mexican supply or had political conditions interfered with receipt of imports we should already have felt the stringency which is certain to come later. It is evident that a condition in which domestic consumption exceeds domestic supply cannot continue indefinitely without such a stringency unless the widening gap is filled by imports.

It has fortunately happened that large supplies of Mexican crude were available, and that these were relatively close at hand so that the cost delivered at our seaboard was small in comparison, let us say, to the price that would have obtained had we been under the necessity of transporting the oil as far as most European countries have to carry their imports of oil.

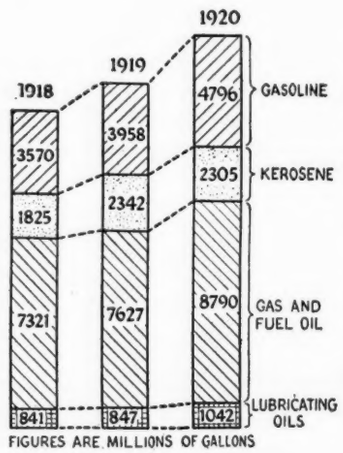

Fig. 2—Chart showing comparative production of petroleum products in U. S. in the last three calendar years. Note the large proportion now used as gas and fuel oil. If this fraction could be used for motor fuel, our potential supply for automotive transportation would be more than doubled

Under these circumstances it is quite apparent why Doctor Pogue, in last week's issue of AUTOMOTIVE INDUSTRIES, made the statement that **"should the curve of Mexican production turn sharply downward in 1922 or 1923, the effect upon the petroleum situation in the United States will be significant."**

This leads us to consider the questions which are inevitably raised when the subject of available supplies of crude petroleum is raised: **Who knows the extent of supplies thought to be available, and who can say that there are not great undiscovered supplies which will take the place of supplies now known to be failing?** Those who are familiar with the history of oil discovery on this continent are apt to point to the fact that heretofore when failing supplies in some fields have threatened to cause a shortage, the impetus given to wildcatting or search for new fields has always resulted in discoveries of such fields as those in Oklahoma and in Mexico which have forestalled the scarcity predicted. Will not this happen again? These are natural and legitimate questions which demand a reply.

In matters of this kind it is necessary to depend upon the geologist, for intelligent estimates can be made only by a knowledge of petroleum geology and a study of production from pools of known geological character. Figures concerning reserves given in this article are deduced from surveys made by the U. S. Geological Survey. The figures are generally regarded as conservative, but some well-informed persons consider the estimates rather too high than too low. It should not be forgotten that the estimates may prove to be too high rather than too low. They are admittedly only estimates, but they are based upon careful surveys and sound engineering deductions, and consequently are a far better guide than the offhand conclusion that, because we have always succeeded in finding oil when it was needed, we shall always be able to do so.

Oil is known to occur in certain types of geological formations, and conversely, where this type of formation does not exist, there is no reason to expect that oil will be found. The geological character of a given section is determined largely by outcroppings of rock or by the nature of material brought to the

surface in drilling operations. In the great level coastal plains or swamp lands which occur in territory such, for example, as that adjacent to the Gulf of Mexico there is often little to guide the geologist in search of oil. When by so-called wildcat drilling, more or less at random, oil is discovered in territory of this kind, the yield is often very great at first, but decreases rapidly and is soon exhausted, as in the case of some of the Texas and Mexican pools. Geologists anticipate that much oil will yet be discovered along our coastal plains, but the possibility that new fields of the character of those found in Pennsylvania and Oklahoma, for example, will be discovered is, to say the least, extremely doubtful.

For this and other reasons it is conservatively predicted that the curve of petroleum production in this country will soon reach a peak, if, indeed, it has not already done so, and will thereafter rapidly decline. This, in the face of constantly increasing consumption, is sufficient reason why any industry which is largely dependent upon petroleum products for fuel should sit up and take notice.

So much for the domestic situation. **Now as to the possibility of supply from foreign sources.** The keen international competition for the control of oil fields wherever they exist is sufficient indication that the great value of petroleum is fully appreciated.

Mexico, next to the United States, has been the second largest producer of petroleum and was not long since producing at about half the rate at which this country was producing. It is estimated that Mexico's proven reserve will have been about half exhausted by the end of this year, and very little, indeed, is being done to locate new supplies there, although in well-informed circles there is expectation that great quantities of oil will still be secured in Mexico. If this possible potential supply is developed in time it will simply postpone the date when a scarcity is felt. It is a doubtful dependency to say the least, especially when it is recollected that the gasoline content of Mexican crude is lower than that of most other crudes.

Fortunately the Mexican supply thus far produced has been close enough at hand to be cheaply transported to this country. Fields yet to be discovered in Mexico may be much less accessible, and the product consequently much more expensive.

It is quite common to hear the remark that there are ample supplies of petroleum on other continents to meet the world's demand, should the supply in this country and Mexico prove inadequate for our needs. It is said that there is oil in China, in Siberia and in several South American countries. How much, nobody knows. So far as China is concerned, we are told by one prominent engineer who has visited that country in quest of oil lands that the probable supply underground is not promising. Some of the known sources of supply in South America are extremely inaccessible, and even if they were close to the seaboard the cost of transportation to this country would be very great. Much the same applies to Siberia, concerning whose petroleum resources but little appears to be known.

To sum up the situation, so far as imports are concerned, it may be said that the future supply is, at best, uncertain. Much petroleum will doubtless be imported to supplement our domestic supply, but with the possible exception of imports from Mexico, the cost of importation will be great and the price correspondingly high.

What, then, is to be said of the remarks dropped on occasion by certain persons of standing in the oil industry who blandly state that there are ample reserves of petroleum in this country to meet all demands for several generations to come? Some persons have reached the conclusion that profits made in selling oil securities are the controlling factor in arriving at this conclusion, rather than a careful weighing of the evidence.

On the whole, it must be said that, while we shall doubtless have an abundant supply of cheap motor fuel for some little time to come, such fuel is certain to become increasingly expensive in the not distant future. This is not a pleasant fact to record, but it is worse than useless to ignore what we know to be true and calmly proceed as if there would always be ample supplies of inexpensive motor fuel.

If we accept this view, and there appears to be no alternative, what is to be done about it? If the industry is willing to think and act far enough in advance of what is now clearly evident, there should be no insurmountable difficulty in adjusting the industry to changed conditions. If, on the other hand, there is a disposition to wait until the forecast stringency is at hand, the

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STATEMENTS are current to the effect that the petroleum supply of the United States will be exhausted within a score of years. Such statements are misleading. Decline curves of the older oil-fields indicate that this country will be producing petroleum fifty years hence, perhaps even into the next century, but in greatly diminished volume.

Irrespective of the quantity of recoverable petroleum underground, the output of this country must inevitably decline. This decline, however, may be expected to be a slow recession over a considerable number of years, rather than a sharp and sudden curtailment. The peak of production was possibly reached in June of this year. That this record will be bettered is unlikely, although it can doubtless be surpassed if we are willing to pay the price. But whether the output of petroleum in the United States has actually or almost reached its maximum rate is immaterial. Likewise, the exact size of the unmined reserve is of secondary importance. The point to be emphasized is the coming necessity for increasing the over-all efficiency of petroleum—a problem that concerns not only the producers and refiners of oil but the manufacturers of appliances that consume its products, as well. From now on the tendency will be to use relatively less of the material itself, but to put greater effort into increasing the service value extracted from it.

There is no valid reason why any activity fundamentally dependent upon liquid fuel should meet with permanent restrictions in energy supply. The heat units available in liquid form are practically limitless, so far as present generations are concerned; we properly utilize only a few per cent of those contained in petroleum and almost entirely neglect the content of leaner resources such as oil-coals and oil-shales. Readjustments in our economic practice there must be; restrictions in our economic growth there need not be. A lessened supply of crude petroleum would present an opportunity; not a handicap.

JOSEPH E. POGUE.

industry is certain to feel the effect more severely than it would otherwise.

There are several courses of action, all of which should receive serious consideration:

First—Every effort should be made to economize in the fuel consumption of cars now in service. There is abundant evidence that these cars use on an average of 20 to 30 per cent more fuel than would be required with properly designed and heated manifolds and properly adjusted carbureters. Manufacturers might, if they would, greatly decrease this waste by providing their service stations with proper instructions and facilities for correcting the faults which result in this waste, and encouraging car owners to avail themselves of these facilities.

It must be quite evident that the nine million cars now on the road in this country will eat heavily into existing domestic fuel reserves before they are worn out. Much can certainly be done by educating the owner in the need for conserving fuel and assisting him to secure economical operation.

Second—All automotive engines turned out in regular production from now on should be made in such a way as to consume the least possible fuel in the service for which they are intended. Numerous ways in which they can be made more efficient in fuel utilization were summarized in an article entitled "Where Are We Getting in Efforts to Solve the Fuel Problem?" which appeared in the June 16, 1921, issue of AUTOMOTIVE INDUSTRIES, and articles dealing with various phases of this subject are continually being presented in these pages.

Third—Intensive research and development work should be undertaken, not only with a view to producing more economical engines, but with the object of developing types of engines which will use economically less volatile fuels than present-day gasoline, preferably those fuels now classed as gas and fuel oil, or a mixture of such oils with gasoline and kerosene. Such engines would preferably adhere as closely as possible to present automotive types, but if a change in type ultimately proves desirable from an economy standpoint, even at the expense of some complication, such a change should be given serious consideration. By reference to Fig. 2, taken from Doctor Pogue's review of the oil industry for 1920 (see AUTOMOTIVE INDUSTRIES for February 17, 1921), it will be seen that over half of our domestic production of crude is consumed as gas and fuel oil.

If the automotive industry had to-day ready for production engines capable of using gas and fuel oil or a mixture containing all fractions of the crude above those classed as lubricants, the potential supply of motor fuel would be more than doubled. Evidently, then, it is very much worth while to look toward the development of such an engine.

Fourth—Every possible encouragement should be given to the production of gasoline substitutes, even though the promised supply of such fuels as benzol and even alcohol will be very small for many years to come in comparison with the total consumption of motor fuel.

Fifth—No stone should be left unturned which will tend to encourage the ultimate production of large quantities of motor fuel from shale oil. It is recognized, of course, that the production of shale oil will never be profitable until crude petroleum advances very considerably in price. There is also great need for investigation to determine what methods of recovering oil, and especially motor fuel, from shale can be used to best advantage. The Bureau of Mines is doing some research in this direction. Funds should be provided to carry this work forward on a large scale and as expeditiously as possible. Automotive manufacturers should make it their business to see that Congress provides funds for this and other work of similar character (that at the Bureau of Standards, for example) calculated to make available new motor fuel resources or make existing supplies go further. Government bureaus are in an excellent position to undertake work of this kind if allotted sufficient funds, and the great economic importance of the whole matter more than justifies the expense.

It should be understood that the recovery of oil from shale involves extensive mining as well as refining operations which require years for development. One commentator draws attention to the fact that "the development of a shale oil industry on a scale sufficient to furnish large quantities of motor fuel is an undertaking comparable to the creation of the whole coal industry of to-day." It will require much time for development, hence a sound foundation on which to build profitably when the demand comes should be prepared now through research and development work.

Sixth—Since increasing quantities of motor fuel are being consumed by commercial vehicles it is important that particular attention be paid to making them as economical of fuel as possible. As the cost of motor fuel increases, the differential in favor of types of vehicles using it, in comparison with other forms of transportation, will decrease. Since the electric vehicle is not in any way dependent upon motor fuel, its future utility may be much increased in comparison with the gasoline-propelled type, and possibilities in this direction should not be overlooked in broad consideration of the fuel problem. Where stops are frequent and fuel is apt to be wasted in engines running idle when the vehicle is not performing useful work, the electric vehicle possesses certain advantages. Generally speaking, the vehicle which is most economical in all-round performance is the one to be advocated for that particular use.

In conclusion let it be emphasized that the situation is one of grave import to the automotive industry. It is idle to deny this fact and indiscreet, to say the least, not to prepare to face it squarely. The industry should organize its forces in such a way as to accommodate itself with the least possible disturbance and as gradually as the situation permits, but no time should be lost in so doing. Automotive transportation is too firmly fixed in our modern social and industrial system to be displaced or abandoned simply for lack of the same abundant supply of cheap fuel which it has always enjoyed. It is unthinkable that this should occur, but we must certainly prepare for readjustment to meet the coming fuel situation, and should do so without an undue period of speculation as to just when the stringency will actually have to be met.

WELDING of cast iron is very difficult, inasmuch as a part of the silicon content is lost by evaporation or burning; then the exceptionally hard white specular cast iron is formed that makes it impossible to touch up the welded spot with the file. Furthermore, when the specular iron cools down it easily cracks. These drawbacks are avoided, according to German patent No. 222,690, by using for welding cast iron bars very rich in silicon and carbon, preferably bars of pure hematite, pig iron or charcoal iron. Owing to the high carbon content of the bars "burning off" is prevented. The welding should be performed as rapidly as possible and with a powerful flame, then cooling slowly in hot ashes.

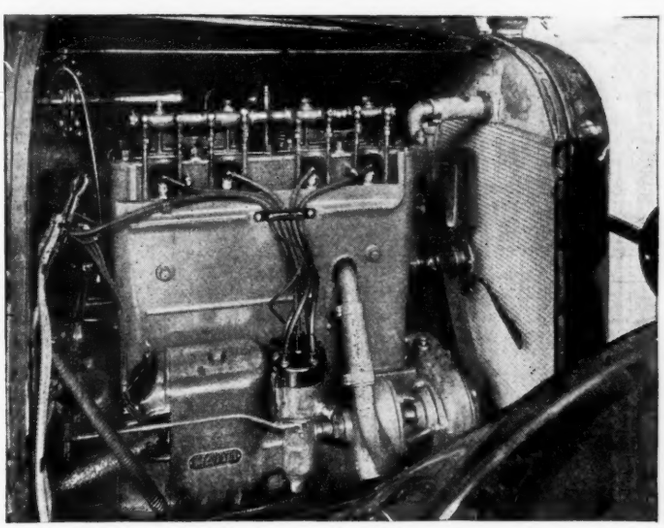
New Buick Four Similar to Six of Same Make

Some innovations are incorporated. New model has separate cylinder head with valves seating directly in the casting. No cages are employed. Single universal is enclosed in ball joint attached to rear of gearbox and is lubricated from this unit. Wheelbase is 109 in. Weight 2380 lbs.

By J. Edward Schipper

THE Buick Motor Co. has added to its line a four-cylinder chassis upon which are mounted bodies of the roadster, touring car, coupe and sedan type. While this additional model is new throughout, it embodies all the characteristics of Buick practice, including a valve-in-head engine. Conservative body designs are a feature of the new line, the bodies being similar to those of the six-cylinder model. A wheelbase of 109 in. is standard for all body sizes and the whole line is equipped with 31 x 4 in. Royal cord tires, a new straight side size made by the United States Tire Co. for this model.

A detail study of the four-cylinder car shows that all the improvements made during the last few years on the six have been incorporated also in the design of this four. From a performance standpoint, the new model should prove adequate in any part of the country, whether it be hilly or flat. With a brake horsepower of 35 to 40 and a shipping weight for the touring car of 2380 lb., the car weight per horsepower is about 60 lb. The final reduction is 4.6 to 1 for all models. This is the same as the ratio used in the five-passenger, six-cylinder car and less than that used in the seven-passenger touring, which is geared at 4.9 to 1. In this connection, however, account must be taken of the fact that the tires on the four-cylinder are only 31 in. in diameter, while those on the five-passenger six are 33 in., and those on the seven-passenger six 34 in.



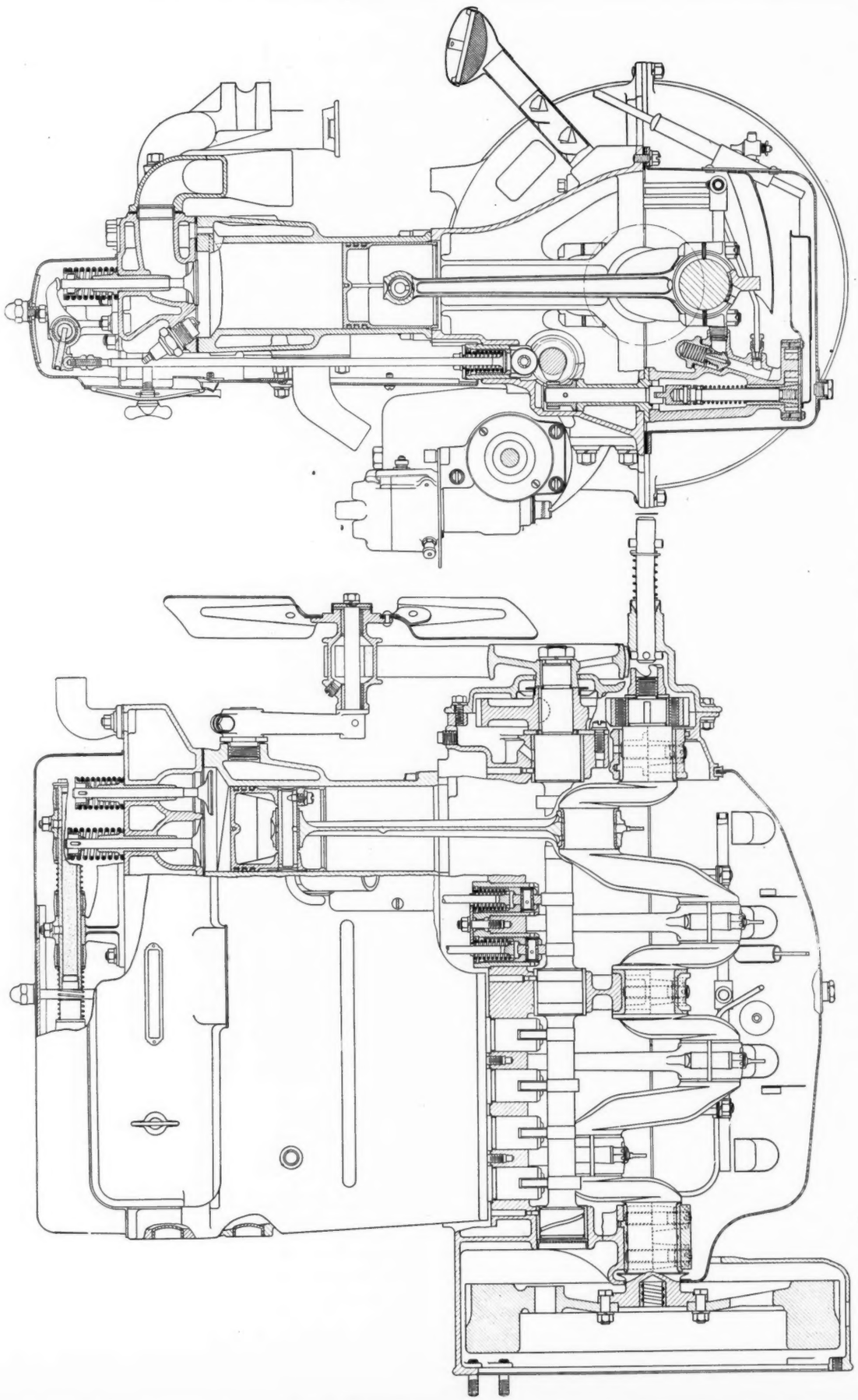
Side view of four cylinder Buick engine, showing pump, generator and ignition unit drive

Cylinder head, cylinder block and upper half of the crankcase are individual iron castings. The lower half of the crankcase is a pressing forming the oil pan, and above the cylinder head is a stamped cover plate which houses the rocker arms and the remainder of the overhead valve mechanism. The four cylinders are cast in a block and have a bore and stroke of 3⅜ by 4¾ in. This gives an S. A. E. rating of 18.23 hp. and a displacement of 170 cu. in. The cylinder block is a remarkably simple casting, consisting only of the cylinder barrels and water jacketing for the upper part of the block. The manifolds are cast in the cylinder head. The valves seat direct in the head casting and operate in pressed-in guides. No cages are employed. The cylinder head casting is cored for water spaces around the spark plugs, valves and manifolds. The piston is cast iron and is of the three-ring type with all three 3/16-in. rings located above the piston pin. Below the bottom ring there is a wiper groove so designed that it will scrape the oil off the wall of the cylinder and lead it to the piston pin bearing. The piston pin bearing is located in the upper end of the connecting rod and the pin is offset 3/32 in. toward the camshaft, the same as in the six-cylinder model. The diameter of the piston pin is ¾ in.

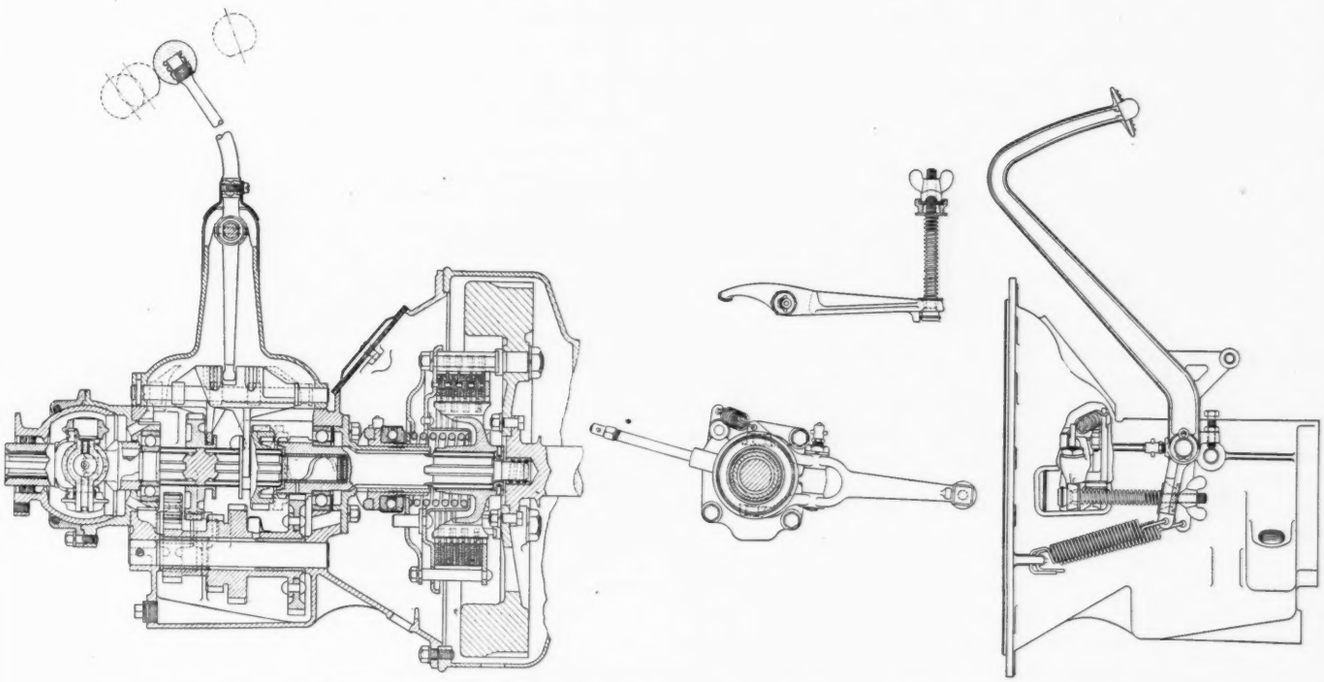
The connecting rod is 12 in. in length, which is exceptional for this size engine. It is a drop-forged I-section rod and carries at its lower end a babbitt-lined bearing 2 in. in diameter by 1⅝ in. in length. The crankshaft is of carbon steel, its large diameter rendering it very rigid. The diameters and lengths of the three crankshaft bearings (front to rear) are as follows: 2 by 2 1/16; 2 by 1¾; 2 by 2 23/32 in. The front and intermediate bearings have two bolts each and the rear main bearing has four bolts.

Camshaft drive is by helical gears. The cam followers are of the roller type, the cams acting against push rods which carry a mushroom-shaped spring retainer at the lower end. The tappet guide contains a coiled spring which helps to keep the roller follower in close contact with the cam and acts as an auxiliary to the valve spring. The push rods have a ball and socket connection at the rocker arm or upper end, where the adjusting means are also located. The ball is hardened and ground. The rocker shaft is supported on the cylinder head, the rocker arms being provided with a rocking chair motion on the upper end of the vertical overhead valve stem.

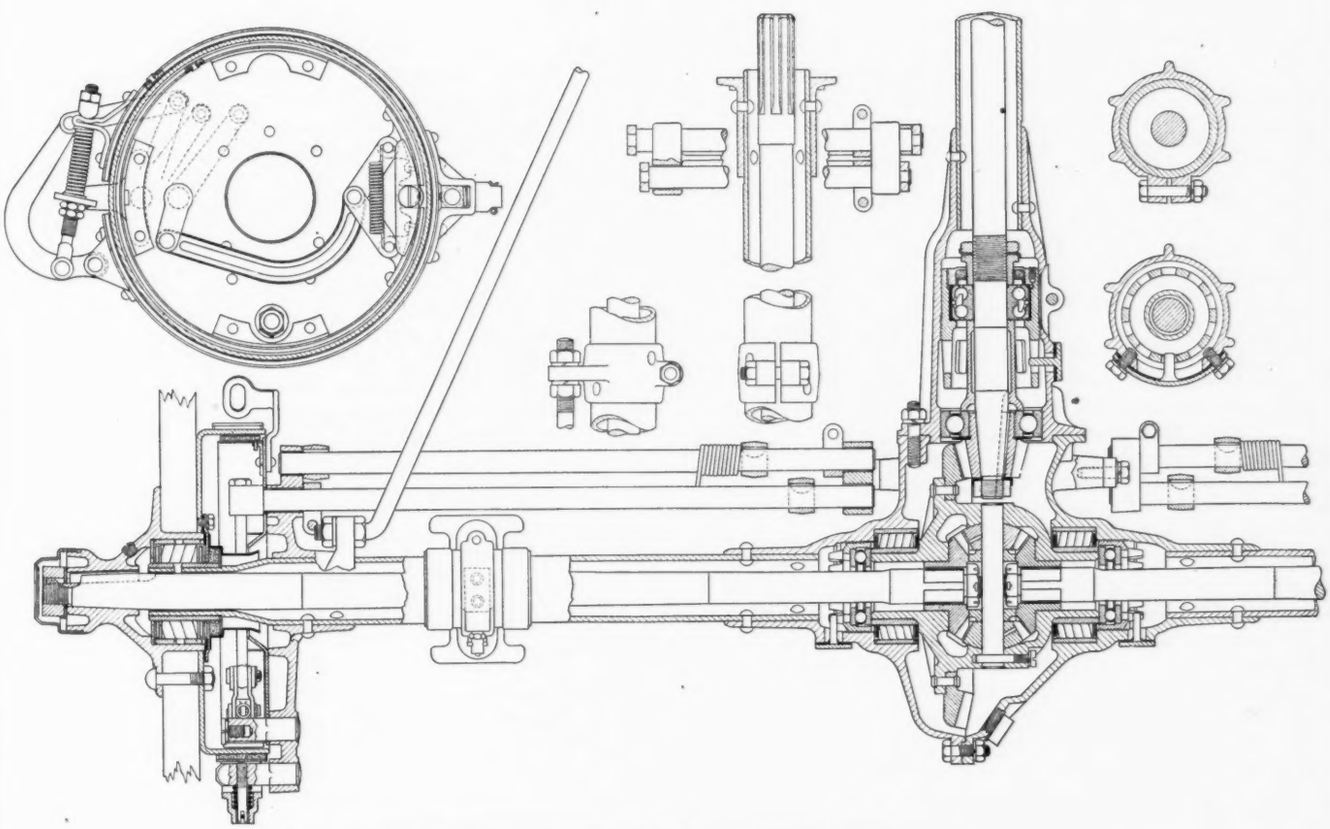
Instead of all valves being interchangeable, the intake valves are larger than the exhaust valves. The



Sectioned elevations of Buick four-cylinder engine



On left: Buick 3-speed gearset and dry disk clutch. In center: Clutch throw-out lever and clutch pedal adjusting device. On right: Side view of transmission with pedal



Sectional view of rear axle and brake and details of same

clear diameter of the inlet valve is 1⅞ in. and that of the exhaust valve 1⅝ in. These valves are larger than those of the six-cylinder engine, although the displacement per cylinder is very nearly the same. The valves of the six are 1⅝ in. for the inlet and 1¼ in. for the exhaust. On the form the valve lifts are 21/64 in. for the inlet and 5/16 in. for the exhaust. The stem diameter is the same for both, viz., ⅜ in. The material of the valve head is cast iron and that of the stems carbon steel. A spring pressure of 76 to 85 lb. is employed, the same as on the six-cylinder car. The valve timing is also identical with that of the six, and is as follows:

Inlet opens 22 deg. 10 min. after upper dead center.

Inlet closes 45 deg. 10 min. past lower dead center.

Exhaust opens 53 deg. 50 min. before lower dead center.

Exhaust closes 9 deg. 10 min. after upper dead center.

The firing order is 1-3-4-2. This timing, in conjunction with a 74 lb. per square inch gage compression pressure, indicates that the engine has high-speed characteristics.

Oiling is by the circulating splash system, the gear pump being located in the oil pan and driven directly from the camshaft. The pump is so constructed that it can be taken out from below for cleaning or inspection and is entirely exposed to view when the pan is dropped. The capacity of the oiling system is 4 qt. The crankshaft and main bearings, as well as the timing gears, are supplied directly from the circulating system, while cylinder walls and other internal parts are taken care of by the splash from the scoops on the lower end of the connecting rods.

Gasoline System

The gasoline system comprises a 10-gal. cylindrical tank mounted at the rear of the chassis beneath a sheet steel cross-member. From this tank the gasoline is drawn to a vacuum tank on the dash and fed by gravity to the 1¼-in. Marvel carbureter. The carbureter is a top-outlet type, mounted on a separate intake manifold. The diameter of the intake manifold at the throat is 1 3/32 in. A damper which controls the exhaust heat utilized is interconnected with the throttle so as to give more heat at low and less heat at high speeds.

The cooling system comprises a square tube cellular radiator having a water capacity of 3¼ gal. and a radiating surface of 304 sq. in. It has a depth of 2½ in. and is fed by a centrifugal water pump driven off the generator shaft. Cooling is assisted by a 16-in., three-bladed sheet steel fan driven by a 1¼-in. flat belt.

The clutch is a multiple dry-disk type having eight disks. The facing rings are 5⅞-in. inside and 7⅝-in. outside diameter, giving a total area of 148.4 sq. in. The three-speed selective sliding gear is mounted directly on the engine. It is of the conventional type, with chrome nickel steel gears having a face width of ¾ in. and a 7-9 pitch. The gearcase is of cast iron. The reductions in the gearbox are 2.8 to 1 on first; 1.69 on second, and 3.73 to 1 on reverse. New Departure bearings are used on the main shaft and plain bearings on the countershaft. The span of this shaft is 6 15/16 in., which is remarkably short.

A 1⅛-in. solid propeller shaft is inclosed in a torque tube which connects the gearset to the rear axle and takes torque on thrust. The single universal joint is inclosed by the ball joint connected to rear end of the gearset and is lubricated from the gearbox. The rear axle is a three-quarter floating type with a malleable iron center housing. The final drive is through spiral bevel gears with nine teeth in the driving pinion and 42 teeth in the ring gear. The bevel pinion shaft is mounted on two New Departure bearings. The differential bearings are Hyatt in connection with a ball thrust. The axle shafts are of chrome nickel steel.

The car is suspended on semi-elliptic springs, the rear springs being 55½ in. long and 2 in. wide, and the front springs 36 in. long and 1¾ in. wide. The spring eyes are bronze bushed and provided with the Alemite attachment, this lubrication system being used throughout the chassis. The brakes are external and internal, on a common drum located on the rear wheels. The drum diameter is 11 in. and the width of the bands 1¾ in. This provides an area of 111 sq. in. on the foot brake, which is the external, and 86½ in. on the hand brake, which is the internal set. The internal diameter of the drum is 10 11/16 in. The steering gear is a Jacox screw and nut design. The steering wheel is 17 in. in diameter and is provided with the usual spark and throttle connection.

All electrical equipment is of Delco make. The distributor is a unit with the generator. The starter reduction is 23.8 to 1, while the generator is geared up from crankshaft in the ratio of 1 to 1.5. The battery provided is an Exide, three-cell type, with a capacity of 80 amp.-hr. at 10-amp. discharge rate. The head lamp candlepower is 21, and dimming is effected by a coil on the switch. A 5-candlepower tonneau lamp and 2-candlepower tail and dash lamps are provided.

All of the bodies are of the low-hung type. The car can be turned in a 36-ft. circle. The standard color is black with a white stripe around the top on the open models. The closed cars are equipped with adjustable windshield visors, a windshield cleaner, dome light, ventilating windshield, adjustable windows and sun-shades for the rear windows. All models are equipped with non-glare headlight lenses and all are provided with a tire carrier and extra rim. The upholstery of the seats on the open models is in leather and on the closed models in worsted material. As an example of the seating allowance on the touring car, the inside width of the rear seat is 46 in. and that of the front seat 39 in. Prices are quoted f.o.b. Flint, Mich., and are as follows: Two-passenger roadster, $935; five-passenger touring, $975; three-passenger coupe, $1,475; five-passenger sedan, $1,650.

New Automatic Wrench

THE wrench illustrated herewith, which is being placed on the market by the Edstrom Machinery Co., has several interesting features. It closes tightly on the nut automatically, and it can be operated with one hand for it can be locked in place by the movement

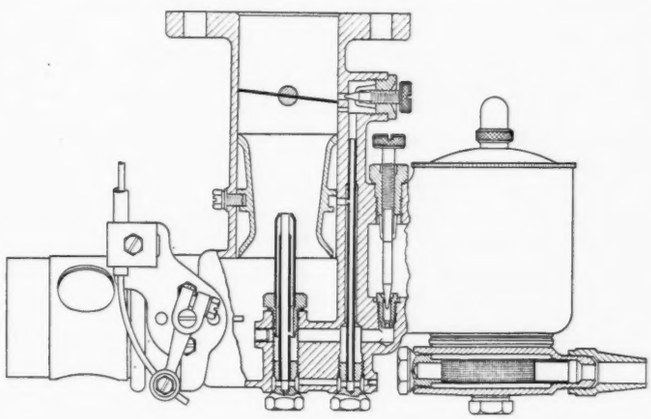
of the thumb of the hand holding the wrench. A positive gripping action is secured by the small teeth on the movable jaw which engage with similar teeth on a sliding lug within the handle. This lug is controlled by the thumb lock, a movement of which forces the lug against the teeth of the sliding jaw, thus holding it securely. The head of the wrench is not excessively large and will fit in many places where a standard open end wrench can be used.

A New Design of Plain Tube Carbureter

Latest design of Holley is of simple construction and arranged for easy application by universal features. Air bleeding device adjacent to throttle provides for idling and low speed conditions, large venturi for high speed.

A NEW carbureter of very simple design and incorporating a number of features of interest is being produced by the Holley Carbureter Co. The new carbureter has been simplified in a great many of its features by the elimination of a number of small parts. There are no moving parts. It is of the plain tube class and has but one master nozzle, which controls the flow of fuel for both idling and running with wide-open throttle.

With this class of carbureter it has been quite easy to make a motor idle or to run with the throttle wide open at full power, but the main difficulty has been in the smooth transfer from idling to the time when the main nozzle commences to contribute its proper proportion of gasoline. The transfer from idle to the full functioning of the main jet should be made smoothly and economically, since about 90 per cent of the driving is done in this range.



Sectional view of new Holley carbureter

The two holes located above and below the throttle plate when the latter is nearly closed give this control. On idling, the upper hole only supplies the mixture, the lower one acting as an air bleeder. As the throttle is opened slightly the bleeder action is reduced, thus maintaining the mixture proportions. On further opening, both holes are exposed to the suction above the throttle. Both act as fuel outlets to supply the extra gasoline made necessary by the larger volume of air passing the throttle.

With this arrangement the Holley engineers state that more freedom is allowed in the manipulation of such other important features as positive acceleration and large breathing capacity for high speed. It is unnecessary to limit the size of the venturi; that is, a large venturi can be used without affecting the smooth and positive operation throughout the driving range. This affords high volumetric efficiency without the compromise otherwise frequently employed to secure good low-speed performance. It should also add to the maximum output of the engine.

A number of interesting details are found on the new instrument. All of the screws are made of nickel steel to resist rust and also to prevent twisting off screws which are depended upon to hold permanent adjustments. No tools are necessary for removing the cover of the float chamber, which is held in place by a spring lock, acting in very much the same manner as a bayonet lock, except that it is continually under tension. Another feature is the strainer, which can be easily disassembled and cleaned without removing the gasoline connection or in any way disturbing the installation of the carbureter. The strainer is cylindrical in form and pulls out at a point opposite the gasoline intake, as shown in the accompanying sectional view of the carbureter. The dirt is left on the inside of the screen, since the gasoline passes from the inside to the outside in entering the float chamber. When removing the strainer, therefore, all of the dirt is removed with it, and the gasoline line free of any deposits which may have entered during the course of operation.

The master nozzle is adjusted by means of a needle valve which, in its effect upon wide-open throttle, has a major influence. The idling adjustment is shown directly below the flange. It is used for extreme low speed. When driving at the lower speeds, with partially closed throttle, there is an accumulation of fuel in the well, and, upon opening the throttle, this accumulation becomes immediately available as a means of enriching the mixture for maximum rate acceleration. It will be noticed that there are no small passages leading to the atmosphere. It has been found that such passages become filled with dust and dirt, and materially interfere with the accurate functioning of the carbureter. All the air enters the carbureter through one entrance, which is always connected to a suitable stove or heater.

The carbureter is universal in that it is possible to swing the strainer and gasoline inlet connection around to any point below the float chamber and to set the choke connection to be controlled from either side, or from any direction. The carbureter can be readily cleaned by removing the nozzle from the bottom. No gasket is required. These features, taken in conjunction with the simple construction of the carbureter, give a very accessible layout and permit installations on any type of engine. The carbureter is at present being manufactured in 1-in., 1¼-in. and 1½-in. sizes, top outlet, and a series of side-outlet carbureters will soon be in production.

The Design of Wind Screens for the Rear Seat

How an insistent demand for better protection of passengers from the weather is being met in England. The tonneau wind screen is likely to become standard equipment on many British cars in the near future.

By M. W. Bourdon

A DEMAND is growing in strength in England for the inclusion of a rear wind screen in the standard equipment of open four and five-passenger cars and, as mentioned in AUTOMOTIVE INDUSTRIES at the time of the last Olympia show, two British makers (Phœnix with a medium-priced car and Lanchester with an expensive one) have already complied. There seems to be more than a possibility that other makers will follow suit and it only requires two or three more well-known firms to adopt this policy to cause this form of protection for the rear passengers to become generally recognized as needful and rule out any car not so equipped as not being considered "ready for the road."

The demand in question applies to medium and high-priced cars at the moment, but obviously it is only a matter of time and example before rear screens are looked for on the lower priced vehicles. Clearly, the inclusion in the standard equipment of this additional item must add somewhat to the price of the car, but it should not do so to anything like the extent of that which now occurs when a buyer—as is very often the case—orders a rear screen as an "extra" or obtains one as an accessory for an existing car.

Rear screens in one form or another, all ostensibly capable of being fitted to almost any car, have been available to and used by a great many British motorists for at least 10 years past, but, as inferred above, these fittings have been relatively costly to install, and it can hardly be said that their design has been without reproach. They have been effective in their main objects, but more or less unsightly encumbrances when out of use.

The point arises, therefore, whether these objections as to cost, design and appearance cannot be overcome when the fitting is provided for in the original design of the body work. As shown hereafter, one British maker, Lanchester, has gone a long way in the desired direction by making the screen fold up neatly, out of sight, when it is not required. The Phoenix rear screen, however, still has the appearance of being an attachment, or an afterthought.

In view of the foregoing facts and possibilities it is of interest at the present time to survey the various forms of rear wind screen now available to British motorists, and the accompanying sketches of most of the different types now being made have been prepared with that object. The types illustrated may well be grouped into five distinct classes, as follows:

Group A. Single non-folding panel screens, adjustable as to rearward inclination and secured either to the back of the front seat or to a rear cowl.

Group B. Single panel with "wings" supported by hinged or telescopic extension arms secured to the back of the front seat. Can be folded up behind front seat when not required.

Group C. Multiple panel supported by vertical pillars, one at each side, two of the panels forming wings. Can be detached, but not folded completely down below top line of body.

Group D. Flexible panel without wings, readily detachable, on light framework, supported by vertical pillars.

Group E. Single panel with wings; "built into" the body and folding out of sight.

Referring to the illustrations, one example of each of the alternatives in group A is shown. In Fig. 1 the single panel, secured to the rear top edge of the front seat, can hardly be effective except in the case of "close-coupled" bodies. When, as illustrated, it is fitted to a normally dimensioned body, the degree of protection afforded to the rear passengers can hardly be held to justify the cost of the fitting. True, it is better than nothing with a head-on wind—though only slightly bet-

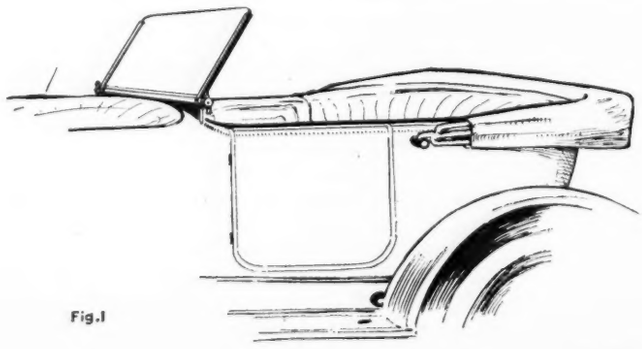
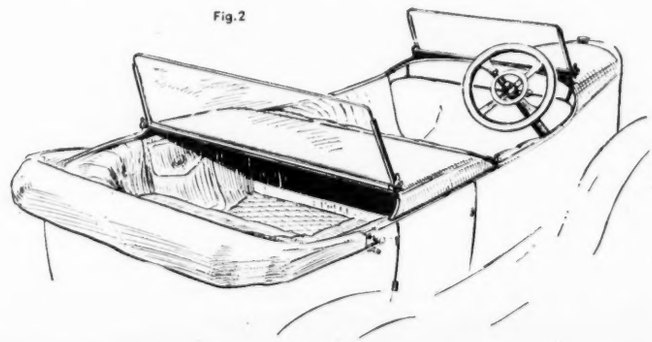
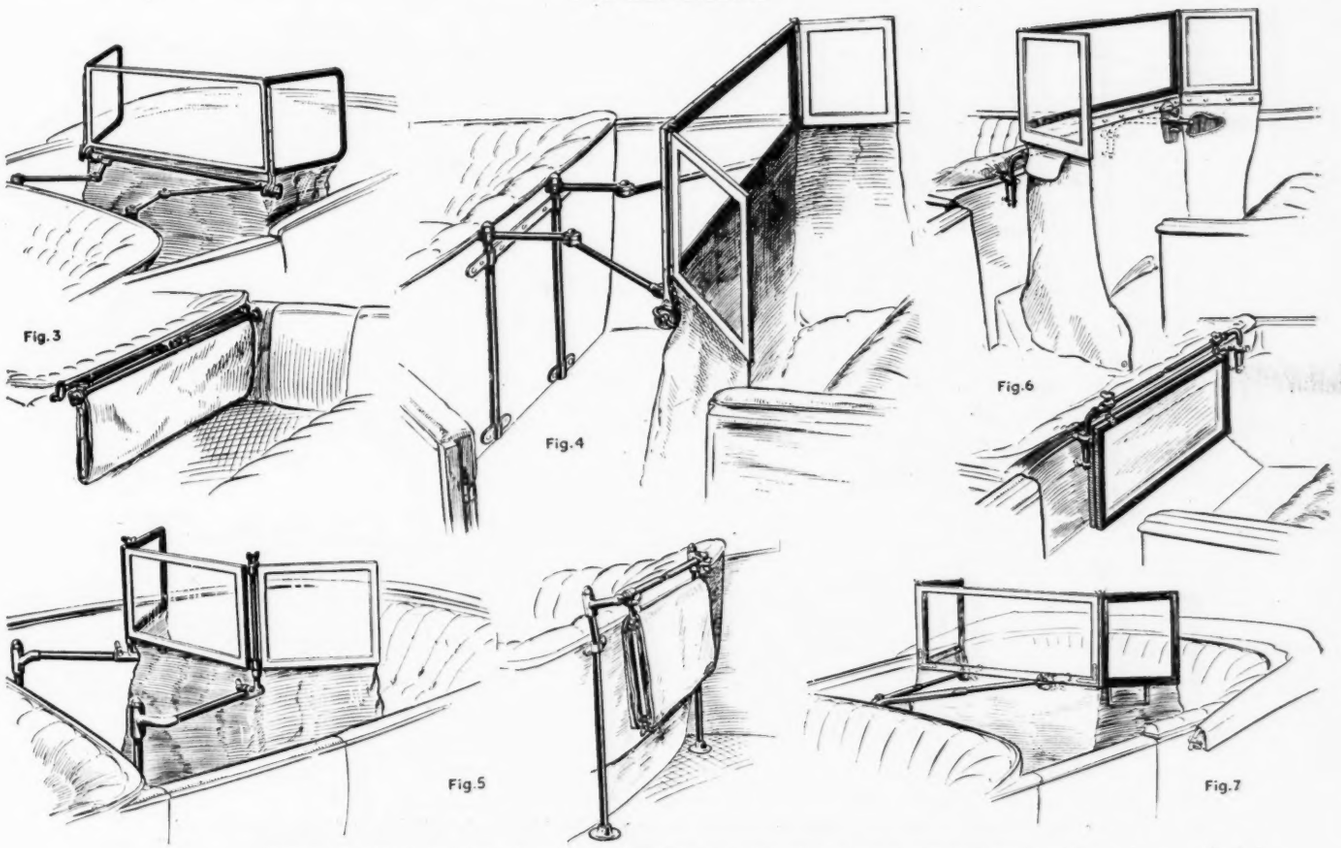


Fig.1

Fig.2



Group A: Non-folding single panel type



Group B: Single panel with wings, supported by extension arms to back of rear seat.

Fig. 3—Auster Fig. 4—Another method of supporting Auster screen Fig. 6—Phoenix
Fig. 5—Beatonson Fig. 7—Perfecta

ter under that condition, and no better with a side wind. But if a screen of the same simple type be fitted at the back edge of a rear cowl, the latter extending as far rearward as the doors and hinged to the back of the front seat as in Fig. 2, Group A, this type of screen becomes worthy of consideration. The writer had a good deal of experience with two cars thus fitted before the war and found the rear seat occupants were, with the screen raised, as well protected as those at the front. If desired, in warm weather the panel can be hinged forward to lie horizontally over the cowl, and the latter itself with the screen attached can be made easily detachable from the car.

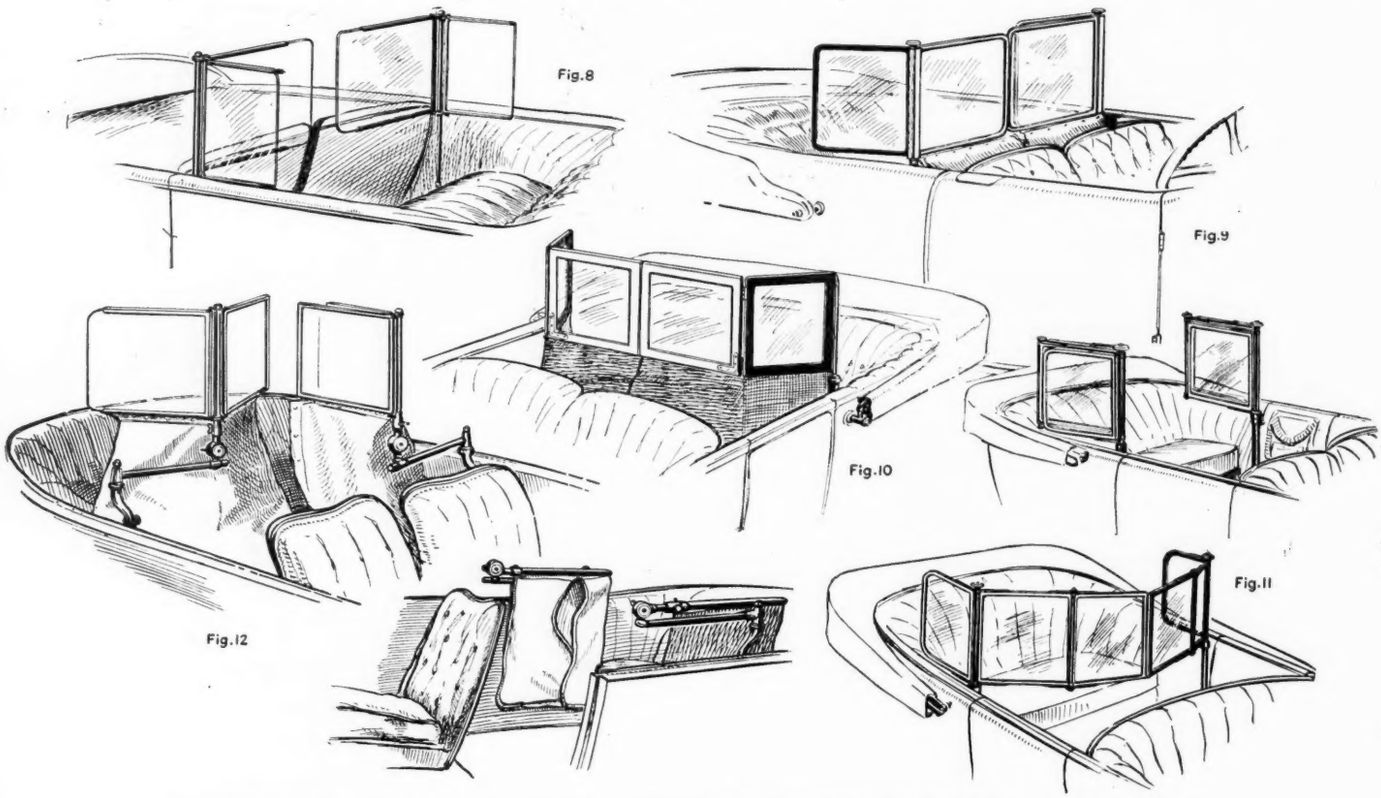
The objection to this arrangement is the slight difficulty and delay experienced by the rear passengers in getting into and out of the car. Obviously the back end of the cowl must be lifted up, and if this be done hurriedly and without care there is risk of damage, either to the heads of the front seat occupants or to the glass of the screen—for if the front seat be vacant the top edge of the screen will make more or less forcible contact with the steering wheel. There is need, therefore—or at any rate it is advisable—to fold the screen forward to a horizontal position over the cowl, and secure it thus, before the cowl is lifted.

Then, too, unless the cowl is only very slightly above the top edge of the body when it is resting on the doors—that is to say—unless it is nearly flat, its sides encroach more or less upon the doorway when it is raised to a vertical position. This was found to be a serious objection in the cases referred to, but in these days, with higher sides to the body in relation to the seats (on British cars, at all events) this difficulty is almost automatically overcome, for the cowl can be almost flat without making a high screen needful to bring its top edge level with the passengers' heads. This suggests that there is call for compromise where the body sides are somewhat low, or the seats relatively high, in endeavoring to provide the required height of the top edge. A deep screen is to be avoided—it should be appreciably less in height than the cowl measures in fore and aft length, otherwise the latter cannot be lifted when the screen is horizontal—and the cowl should not be much above the body line for the reason already mentioned.

Despite the drawback referred to and the somewhat permanent nature of the arrangement, which prevents it from being folded right away, this scheme has points of advantage over the alternatives. It should be comparatively low in cost if standardized; it is certainly effective in the case of head winds by reason of the screen panel being near to the passengers, and in side winds it affords quite as much protection as can reasonably be demanded. It does not prevent the passengers from using rugs, and the cowl keeps off those swirling blasts which normally circulate around the passengers' feet.

The cost in low-priced cars (and the weight in all) could be reduced by using non-inflammable celluloid instead of plate glass, though additional framing and a central support would be required. This form of transparent material for the panels is already in use in other types of rear screens and is not objected to by people with limitations on the score of price. The cowl could be made and fitted quite cheaply in quantities if the front seat back were designed and shaped with the addition in view.

Turning now to Group B, Fig. 3 shows an early example of this type, the Auster. The extending arms are supported by brackets secured to the front seat framing under the upholstery or at the top of the rear panelling—usually the former. The central glass panel is adjustable as to inclination and when moved carries



Group C: Multiple panel type, supported by vertical pillars, detachable but folded below top line of body

Fig. 8—Special arrangement made for an Armstrong-Siddeley owner
Fig. 9—Straker-Squire
Fig. 12—Another Auster design
Fig. 10—A new Auster design
Fig. 11—A variation of new Auster design

the wings with it, though the latter can be swung inward or outward without moving the main panel. They are held in position automatically by the teeth of the spring-backed hinge plates. The apron or rug is attached to the screen by turn-buttons and, of course, moves with the panels. Fig. 4 shows a variation in the method of supporting this type of screen, suitable for use when the front seat framing is rather light. Fig. 3 shows metal framing for the glass and Fig. 4 mahogany framing. As regards the prices at which these two types are sold in England, the metal framed pattern is approximately $75 (at normal exchange) and the other $50. The former is made with panels of various dimensions, while the latter is supplied in one size only as follows: Center panel 32 in. wide, wings 14 in., arms allow extension of 20 in. from back of front seat.

Another popular "accessory" rear screen (the Beatonson) is shown in Fig. 5. This also is in Group B and differs from the Auster in the method of support. The two illustrations showing the screen in use and folded are practically self explanatory; it need only be said that this design does not allow of the main screen to be used other than vertical and as a means of deflecting the wind over the passengers' heads is not so effective on account of that shortcoming. At the same time the back draughts are not excessive, no more so than those arising from the usual windshield—especially when the permissible length of extension arms is such as to bring the panels close to the passengers.

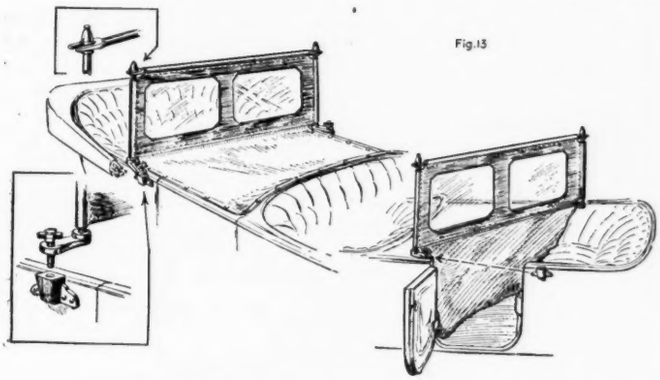
Fig. 6 shows the standardized rear screen used on Phoenix cars. Except for the bracket supports instead of pillars it closely resembles the Beatonson. It has mahogany framing for glass panels; the waterproof apron is included with the screen in the car's equipment.

Telescopic extension arms are used in the Perfecta (Fig. 7) and the arms are supported by a central bracket attached to the front seat frame. In this case also there is no provision for inclining the main panel. As might be surmised this screen has to a pronounced extent the great failing of extending rear screens in general, i.e. the lack of rigidity due to the distance of the screen from its point of support. In some cases this weakness is extremely disconcerting to say the least, and the blurring of the view when the glass is other than perfect or spotlessly clean is very trying to the eyes.

This type in general is not sightly; it is, in fact, considered by many people a mere makeshift, an obvious after thought, and they bear with it only because it is more or less effective in meeting a definite requirement. There is no question but that it "spoils the lines" of many an otherwise shapely car outline. It certainly is not to the credit of those who have catered for this class of fitting that for so long they have seemingly made no endeavor, not until recently, to improve upon it.

In Group C the first illustration (Fig. 8) shows an arrangement specially made for the owner of a close-coupled Armstrong-Siddeley four-passenger car with separate sliding front seats and one door on each side at the front. This design, and that shown in Fig. 9, which is quite similar, has the merit of a neat appearance, and is, according to the owner, quite effective, the gap between the center panels in this particular case is said not to permit any draught worthy of mention to pass. The vertical standards of the panels in Fig. 9 are set slightly farther back, which should be of advantage, the gap thus allowed between the screens and the front seats being fitted with short "aprons" secured by snap buttons.

While in both the cases just mentioned this type is fitted to a close-coupled four-seater with front doors only, the principle is applicable to normal body designs, and that it has openings for variation is evident from



Group D: Flexible panel type without wings, supported by vertical pillars. This type is readily detachable

Fig. 13—A single example of this type

Figs. 10 and 11. In the former the four panels are inside the body, the outer ones are clipped together at the back of the framing to prevent rattle and lend additional support. The apron is divided, half attached to each pair of frames. At present the maker (Auster) is providing pillars which can be vertical only, but there is no reason why with slight modification of the supporting brackets they should not be made adjustable so that the screen as a whole could be inclined rearwardly if that were found desirable.

In Fig. 11 there are, as seen, six panels supported by two side pillars. This arrangement is practically the same as in Fig. 10 plus side wings, though the framings are of metal in place of wood. In both cases the pillars are secured to the side framing of the body just behind the door by clips and screws top and bottom.

Another Auster design, Fig. 12, is the same in principle as the last four mentioned screens, but has modifications that hardly make it appeal to the aesthetic sense, whether or not it be considered more effective in practice. And even in the latter respect, in providing universal adjustment, the maker has perforce lost that rigidity, the lack of which is a decided shortcoming in his original and still standard pattern—the extending screen in Fig. 3. The only advantage secured by the decidedly unsightly bracket, levers, etc., in Fig. 12 is that the screens with their individual aprons can be folded down to the body sides as suggested in the lower view; but even when there the screens spoil the appearance of the car and should certainly be capable of being supported at a lower level.

The solitary example of Group D (Fig. 13) is decidedly crude in detail design whatever may be said for the principle involved. But for cheap cars it has possibilities which seem to warrant reference to its constructional features. The lateral strip is of fabric with inset non-flame celluloid panels and is supported by one horizontal and two vertical "irons" which pass easily through wide hems or pockets at sides and top. The side supports have grooved "acorns" screwed on at the top and cranked lower ends with integral pegs and hand grips or wheels, the pegs being tapered with square tips to fit into sockets attached to the body. Thus the side pillars can be swiveled around a center formed by the peg and located in one of four positions by the squared peg and socket; this arrangement forms a tensioning device for the fabric strip, the top bar having forked ends to allow of this lateral extension.

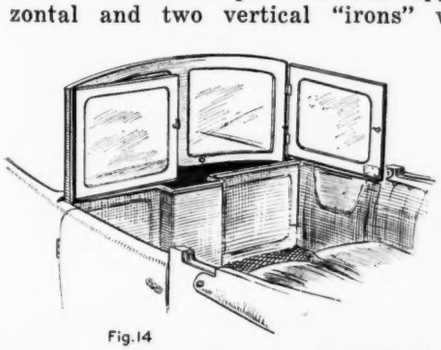
There are four sockets for attaching to the body, two for normal use and two attached in front of the doors so that the side pillars can be located and the screen held out of the way when passengers are to enter or alight. The second sketch shows this alternative position. When the screen is not required it can be removed and dismantled, the rods being withdrawable so that the fabric strip can be folded and stowed away under the seat cushion or elsewhere.

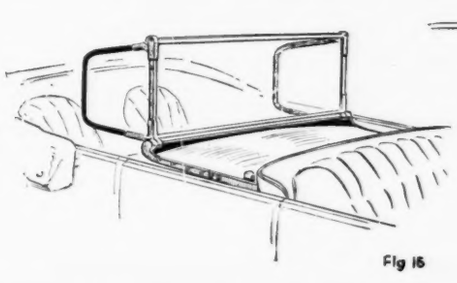
There is no locking device to hold the tapered pegs in their sockets, the weight and the tension on the fabric sufficing to keep them from jumping out of place on rough roads. At all events the latter is the case when the screen is new and properly dimensioned; but there is a lack of precision and scope in the tensioning arrangement which suggests a state of affairs where the fabric strip is loose or yet cannot be stretched enough for the next position of engagement of the squares to be reached. In this respect there is room for improvement and also in regard to the connections between the ends of the upper bar and the side pillars.

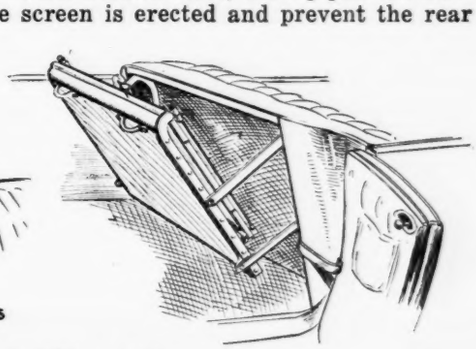
This form of screen is not, of course, to be considered seriously as a fitting for an expensive car, but if there arises a universal demand for rear protection on all cars it has the foundations of a practical form which could be made and fitted at a very low cost.

The last two illustrations showing examples in Group E come into a category at the other end of the scale. Fig. 14 indicates the scheme devised by a coach builder for a custom-built body and is lacking in certain respects, much as it might be commended for its folding-up-and-stowing-out-of-sight feature; it is too cumbersome and heavy, and too far forward. The last mentioned fact results in the disadvantage of all rear screens which are close behind the driver, i.e. the incessant and excessive back draught which they cause the driver.

The Lanchester arrangement (Fig. 15) is a far more desirable fitting from every point of view. When in use it consists of a single panel hinging screen with wings secured to what has the appearance and effect of a rear cowl. But the whole can be instantly shut down and folded away to form the back panel of the front seat, the underside of the cowl portion is covered with cloth and appears quite normal when it serves its secondary purpose. The cowl, it will be seen, is carried by two pairs of pivoted arms of flat section steel; the top pair lie horizontal when the screen is erected and prevent the rear







Group E: Single panel with wings, arranged to fold out of sight in body.

Fig. 14—Bristol. Fig. 15—Lanchester

edge of the cowl from sinking beyond the horizontal, and the front edge from lifting, by reason of their resting upon "stops" formed by the top end of the lower pair of arms. To fold the cowl away the rear edge must be lifted, weight imposed upon it being resisted by the lower pair of arms in tension. Obviously a little care is needed in laying out the design and in fitting to insure that a jamb does not occur in the pivotting of the arms; otherwise the system of supporting the cowl and screen is as simple as it is effective, though it needs a slight measure of side support to prevent lateral sway. This is afforded by the closed doors of the car.

Every benefit of the cowl and screen system of Fig. 2 is provided by this Lanchester system and at the same time it overcomes practically all the objections raised against the other; it is not unsightly in use or out of use, like those rear screens with extending arms and is even more readily collapsed when required. There is nothing in its fundamentals which necessitate its being costly to make and can be easily adapted to quantity manufacture as a standard attachment. As a stock accessory for fitting to existing cars it is not feasible; but that is not what is called for, so the writer takes it, by those firms who are looking out for a simple and satisfactory form of rear screen to adopt and add to the standard equipment of their cars.

New Standard List of Machine Screws

IN line with the general tendency toward standardization and the elimination of unnecessary parts in the mechanical industries, the Bureau of Standards and the National Screw Thread Commission have been consulting with manufacturers of machine screws for the past several years with a view of standardizing the product of this industry and eliminating unnecessary sizes. A temporary organization of machine screw manufacturers was formed for the purpose at the suggestion of the Bureau of Standards, which was joined by the manufacturers of more than 90 per cent of the product of this industry, and at a meeting held at the Engineering Societies Building on May 18 the recommended list of the National Screw Thread Commission was unanimously adopted.

In the new list, issued on June 15, a considerable number of unnecessary sizes and pitches are done away with. There is a fixed pitch for each diameter in both the coarse and fine thread. The coarse thread pitches are the standard, and screws of these pitches will be carried in stock by manufacturers. The coarse pitches are substantially the same as have been in use for a great many years and no change in shop practice or tools is necessary. Fine thread screws will be made to order only, but as the wire for them will be carried in stock, it will be possible to deliver them on short notice. Sizes in the fine thread series, for which a particularly strong demand develops will later be considered for manufacture on a stock basis.

The most important change from the old list consists in the elimination of numbered sizes above No. 12. All machine screws above No. 12 in the new list will be in fractional sizes and confined to the coarse and fine thread pitches, which meet all manufacturing requirements. The standard sizes are shown in the accompanying table.

STANDARD MACHINE SCREWS
ROUND HEAD — FLAT HEAD — FILLISTER HEAD

Threads Per In.	56	48	40	40	32	32	24	24	20	18	16	14	13
	64	56	48	44	40	36	32	28	28	24	24	20	20
No.	2	3	4	5	6	8	10	12	1-4	5-16	3-8	7-16	1-2
1/16	*	*	*	*	*								
3/32	*	*	*	*	*	*							
1/8	*	*	*	*	*	*	*						
5/32	*	*	*	*	*	*	*	*	*				
3/16	*	*	*	*	*	*	*	*	*				
7/32	*	*	*	*	*	*	*	*	*				
1/4	*	*	*	*	*	*	*	*	*	*	*		
5/16	*	*	*	*	*	*	*	*	*	*	*		
3/8	*	*	*	*	*	*	*	*	*	*	*	†	†
7/16	*	*	*	*	*	*	*	*	*	*	*	†	†
1/2			*	*	*	*	*	*	*	*	*	*	*
9/16			*	*	*	*	*	*	*	*	*	*	*
5/8			*	*	*	*	*	*	*	*	*	*	*
11/16			*	*	*	*	*	*	*	*	*	*	*
3/4			*	*	*	*	*	*	*	*	*	*	*
13/16				*	*	*	*	*	*	*	*	*	*
7/8						†	*	*	*	*	*	*	*
15/16						†	*	*	*	*	*	*	*
1						†	*	*	*	*	*	*	*

*These sizes are made in both steel and brass.
†These sizes are made in steel only.

Ample Supply of Wood Wheel Material

THE "American Lumberman" prints this question from one of its readers and a reply. This is interesting, as it will correct a belief apparently prevalent in the automotive industry:

In talking to an automobile salesman recently about the superior qualities of wooden wheels for automobiles as compared to wire wheels, he rather dolefully said that the public would have to get used to metal wheels soon, for it is now almost impossible to get the hardwood with which to make such wheels. I am wondering if this is correct.—Inquiry No. 206.

[Hickory is one of the best woods for automobile wheels, and there is no immediate danger of the exhaustion of hickory. So far as can be judged from present conditions, it will be one of the last woods of this country to fail in supply. Much is used for handles and vehicles, but it grows rapidly. It is at least as much of a domestic tree in its habits as black walnut, and grows along fences and in old fields where it is at its best. It is peculiar among woods in that the faster it grows, the better it is. Second growth—that is, fast-growing hickory—is preferred for many purposes. The wide rings of spring wood which are found in open ground hickory trees give a strength and toughness, exactly what is desired by makers of vehicle wheels. It will be a long time in the future before automobile makers cannot get wood for wheels if they want it.—Editor.]

THE preliminary work in connection with the opening of aviation routes across the Sahara desert has presented many difficulties, but most of them appear now to have been overcome, and it is announced that a military route is being organized from Dakar to Bamako and Timbuctoo. Every 1000 kiloms, a center is being established where, in addition to stores, there will be every convenience for carrying out repairs, while smaller stations with stores and maintenance facilities are being arranged every 250 kiloms. There will be landing grounds every 50 kiloms. The route from Dakar to Timbuctoo appears to offer far less danger than the one from Southern Algeria, where the efforts to create a service across the desert have so far failed. It is remarked that prospecting work has been carried out over the Dakar route for many months past without a single accident.

Grinding in the Automotive Industry

Part I—Abrasives and Grinding Wheels

In this, the first of a series of articles, the author describes the various kinds of grinding wheels, pointing out the difference in material used. Factors governing the selection of wheels, cutting speeds, balancing, truing, and troubles in grinding are among the items covered.

By P. M. Heldt

GRINDING has undoubtedly been practiced ever since metallic cutting tools were first used. The original abrasive was sandstone, which was found ready for use in nature, except that it had to be worked into the cylindrical or other shape required. As it is relatively soft stone this was not difficult. Later on other natural abrasives came into use, including emery and corundum. Emery was the basic material of grinding wheels for a long time, and the word "emery wheel" became so firmly established in the vocabulary of the machine shop that even to-day all grinding wheels are commonly being spoken of as emery wheels, although the proportion of wheels now made of emery is very small. The proper term to use is "grinding wheels."

Emery and corundum are minerals containing a fairly large percentage of aluminum oxide (Al_2O_3). Emery is merely an impure form of corundum. For making grinding wheels, the mineral is ground or crushed, separated into grades of fineness by screening, mixed with a binding material or bond, formed into the shape required and "burned" to impart to it the tenacity needed by a body subjected to high speeds of revolution, and to mechanical pressure and even shock. Emery and corundum are mined in Asia Minor, India, Ceylon and Canada and in the United States in Massachusetts, North Carolina, Georgia and Montana.

About 20 years ago artificial abrasives came into use. The reason for this was that the natural abrasives did not always come in the desired degree of uniformity. Emery contains up to 64 per cent of aluminum oxide, the rest being impurities. Naturally the value of the mineral as an abrasive varies with the nature of these impurities and inversely as the proportion thereof. The chief impurities in emery are amorphous alumina, silica and iron oxide. Moreover, the aluminum oxide itself appears to exist in several allotropic forms, the highest forms being those represented by the ruby and sapphire. Corundum is composed of aluminum oxide to the amount of 92 per cent.

Two Kinds of Abrasive

Artificial abrasives are a product of the electric furnace. There are two general kinds, one composed chiefly of aluminum oxide and the other of silicon carbide. The former kind, the aluminous artificial abrasive, was first produced by the Norton Company whose trade mark name for it is Alundum, while the silicon carbide abrasive was first produced by the Carborundum Co., whose trade name for the product is included in its corporate name. The basic patents on the processes by which these products are made have now expired, and both classes of abrasive are made by about a dozen different concerns, each using its own trade name.

Aluminous abrasives, of which alundum is the prototype, are made from the mineral bauxite found in large quantities in Arkansas, from which metallic aluminum is also made. The mineral is fused in the electric furnace and cast into pigs, which are then crushed between jaw crushers and rolls and sized by means of screens. The fineness of grain is indicated by a number which denotes the number of meshes to the inch of a screen which will just pass the grains. The mesh or grain size varies from comparatively small numbers up to 120, beyond which there are the abrasive flours, used for polishing. Silicon carbide abrasives are made by heating in a resistance type of electric furnace a mixture of powdered coke, sand, sawdust and salt, the pigs produced being treated in very much the same manner as the pigs of aluminum oxide. Only coke and sand enter the reaction.

By varying the treatment in the electric furnace several different grades of aluminous abrasive can be produced. Thus the Norton Co. at present has three different grades, known respectively as the regular grade and grades 38 and 66. Generally speaking, aluminous abrasives are best suited to grinding high tensile materials like steel, while the silicon carbide abrasives are best suited to the grinding of such materials as cast iron, brass, bronze and aluminum. Silicon carbide is harder and more brittle than aluminous oxide, and its grains therefore break more easily under the strain imposed by the high tensile materials.

The Bond

In making grinding wheels the abrasive material is mixed with a binding material or bond. There are quite a number of these bonds, but that most commonly used consists of clay formed into a plastic mass by the admixture of water. The material is then poured into molds, dried, shaved to size and burned or vitrified in a kiln. In preparing the mixture, all of the ingredients are weighed, so as to accurately maintain the correct proportions. After burning the wheels are trued, tested for strength and inspected.

Other wheel bonds consist of sodium silicate (water glass), shellac and rubber. Silicate wheels, as they are known, are produced by making a mixture of the abrasive, silicate of soda and certain other ingredients, thoroughly intermixing them, ramming the mixture into a mold, allowing it to dry and then subjecting the wheels to a moderately high temperature. These silicate wheels are light gray in color.

Elastic wheels, made with a bond of shellac, are used mainly in very thin forms. The heated abrasive is mixed with the shellac in the proper proportion, the mixture is allowed to cool and is then forced into molds, either hand

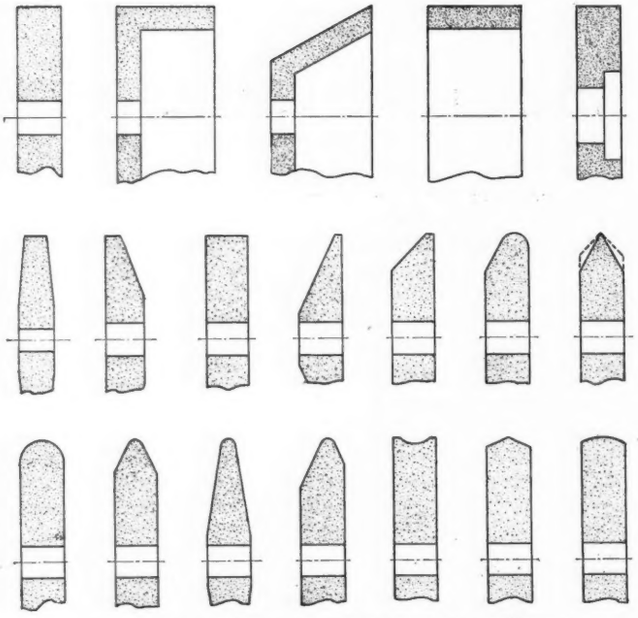


Fig. 1—A collection of grinding wheel sections

pressure or hydraulic pressure being used. The wheels are then baked at a moderate temperature. These wheels are nearly black in color.

The rubber bond sometimes used consists of India rubber mixed with a certain proportion of mineral matter, to which the abrasive is added. By heating the mixture, vulcanization of the rubber is produced and the desired degree of hardness is obtained by varying the composition of the bond. Where very thin wheels are required they are cut out of sheets of the proper thickness, made in calendering machines, while thicker wheels are made by pressing the mixture into molds, the same as with the other compounds.

Each kind of bond has its special properties which render it suitable for certain classes of work or under certain conditions. Vitrified wheels, that is, wheels with a clay bond, constitute approximately 80 per cent of all those manufactured, and it may therefore be concluded that they best meet the conditions in the majority of cases.

The vitrified bond is very porous and therefore permits of a free cutting action. It is easier to obtain uniformity of quality than with some other bonds, and uniformity, of course, is a very important desideratum. Vitrified wheels are immune to the influences of water, acids and temperature changes. Aside from these important advantages there are, however, a number of disadvantages connected with the vitrified bond. The process of making the wheels is a rather slow one, requiring a period of a month. Some authorities assert that the high temperature necessary for burning the bond tends to weaken the grains of the abrasive. This is denied by others. The wheels cannot be made very thin, as they do not offer sufficient resistance to lateral strains. Moreover, in the case of wheels beyond a certain diameter there is danger of breaking in the kiln. This latter difficulty, however, has been mastered by leading wheel makers and the size of wheels is limited only by the handling facilities.

As regards the fields of adaptability of wheels with the different bonds, it will perhaps be best to enumerate the uses to which wheels with non-vitrified bonds are adapted, leaving it to be inferred that vitrified wheels are used for all other work. In the harder grades the silicate wheels are quite dense and therefore not as free cutting as desirable. The moderate baking temperature is an advantage from the production standpoint and the period of manufacture is only about one-fourth as long as with the clay bond. It is believed by some that the sodium element in the silicate wheels is responsible for the particularly fine cutting qualities in wet grinding, insuring a smooth surface and keeping down the temperature of the work. This, however, may be due to an illusion that a soda solution which is a good cutting compound, is formed. Wet tool grinding and wet surface grinding on hardened steel is the particular field of silicate wheels, and they are specially favored when the wheels must be cup-shaped.

Elastic wheels, that is, wheels with a shellac bond, are used where the wheel must be very thin, as for cutting off stock and where the work must have a fine finish and must not be unduly heated for fear of spoiling the temper, as in ball race grinding. The fine finish is due to the elastic properties of the wheel. Elastic wheels are less porous and therefore less free cutting than vitrified wheels, and they will not stand as much heat; they are also more expensive.

Rubber bond wheels are generally made somewhat harder than elastic wheels and are used where thin wheels are required for hard work, where the pressures required might break elastic wheels. The outstanding feature of the rubber wheel is its strength, and such wheels are used wherever wheels with other bonds would not be sufficiently strong, as in some heavy snagging operations.

It will be understood that each kind of abrasive can be combined with each of the different bonds enumerated. Thus there are vitrified aluminous wheels and vitrified silicon carbide wheels; silicate aluminous wheels and silicate silicon carbide wheels; elastic aluminous wheels and elastic silicon carbide wheels, etc.

Abrasive Cutting Action

The bond not only determines the strength and elasticity of the wheel but also its degree of hardness or what is generally referred to as the grade. Before going into the different grades used and the need for a variety of grades, it is well to explain the general theory of grinder cutting action. The grains or particles of abrasive have very sharp edges which, as the wheel revolves in contact with the work, causes them to dig into the metal and take off chips the same as a cutting tool. As this action goes on the edges of the grains gradually become dulled and the pressure to which the grain is subjected increases in proportion. After this has been going on for some time the pressure on the grain becomes so great that the bond lets go of it, and a new grain then comes into action. It is, therefore, exceedingly important that the hold which the bond has on the grains of abrasive be exactly right for the particular working conditions. If the bond is too weak, that is, if the wheel is too soft, the wheel will wear with undue rapidity; on the other hand, if the bond is too strong, that is, if the wheel is too hard, the dulled grains of abrasive will not break away from the wheel and the latter will become glazed. To meet all conditions, grinding wheel makers furnish as many as twenty-five different grades, each grade being designated by a letter or number.

There is a specific formula for each grade, but after the wheels are burned they are subjected to a hardness test by means of a small steel tool. The resistance which the wheel shows to the penetration of this tool indicates its hardness and it is graded accordingly. In making machined parts commercially it is impossible to machine them to the exact nominal size, and it is necessary to allow tolerances. So in the production of grinding wheels no exact degree of hardness can be maintained, and all those between certain limits are classed as of one grade.

There are, therefore, four characteristics of a grinding wheel, namely, the abrasive material, the bond, the grain size and the grade or degree of hardness. It will be

readily seen what an enormous number of combinations of grain, grade, abrasive and bond are possible. For instance, figuring on five different abrasives, four different bonds, 25 grades and 50 grain sizes, the possible number of combinations is

$$5 \times 4 \times 25 \times 50 = 25{,}000$$

These are what might be called quality combinations. Plain cylindrical wheels are also made in many different diameters and widths and there are many wheels of other than cylindrical form, see Fig. 1, so between quality and size combinations there is an almost endless variety.

Selection of Wheels

The selection of the proper combination, and especially of the proper grain and grade, is a problem for the grinding expert. Although certain definite rules have been established, the best grain and grade of wheel for a particular job are generally determined experimentally. From the known rules and accumulated experience a first rough choice is made. This wheel, and wheels similar to it in grain and grade, are tried out in actual work, and whichever combination gives the best service is chosen. Each manufacturer of abrasive wheels issues a table of grains and grades to serve as a guide in the selection of the proper wheels. This table, of course, applies only to the wheels of that particular maker.

The grain and grade of the proper wheel depends not only on the material of the part to be ground but also on whether the grinding is cylindrical, internal or surface. The reason for this is not immediately obvious, but may be seen by referring to Fig. 2. It will be observed that in internal grinding the width of the cut is very much greater than in cylindrical grinding, if the dimensions of the work and wheel in the two cases are at all comparable.

Factors Affecting Grain and Grade

It may be set down as a fixed principle that for each job—the material, form and surface speed being fixed—there is a certain grain and a certain grade which will give the best results. Results, of course, are measured in terms of speed of production, quality of work and wear of wheels. If durability of wheels can be sacrificed to speed of production, a somewhat softer wheel can be used. Coarse grained wheels tend to cut faster and also to wear faster, but the limit of grain size that can be used depends upon the power available, among other things. To a certain extent the finish depends upon the grain, but a fine finish can be obtained with a coarse grained wheel provided it is properly trued. When a wheel cuts freely it does not generate a great deal of heat but runs comparatively cool. Coarse wheels are used where it is desired to remove a good deal of stock in the shortest possible time without regard to finish. With large grains a deep cut can be taken without danger of clogging or glazing the wheel.

In finishing parts made of soft steel and certain other materials extensive use is made of combination wheels, that is, wheels containing more than one grain size of abrasive. Such wheels give a better finish than a wheel containing only the coarser grain and remove metal faster than a wheel containing only the finer grain.

One of the rules followed in the selection of wheels is that the larger the area of contact the softer should be the grade of the wheel. Thus, internal grinding calls for a softer grade of wheel than surface grinding under otherwise similar conditions, and cylindrical grinding for a harder grade. For work of very small diameter a comparatively hard wheel should be used, and a very narrow wheel also should be harder than a wider one. Sometimes, when the wheel is being run at too low a speed, particles of metal will adhere to its surface, and the wheel is then said to be loaded.

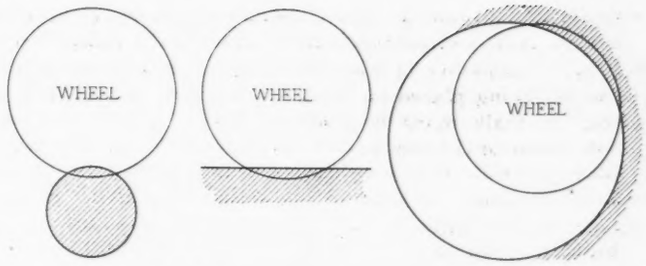


Fig. 2—Showing variation in width of cutting surface in cylindrical surface and internal grinding

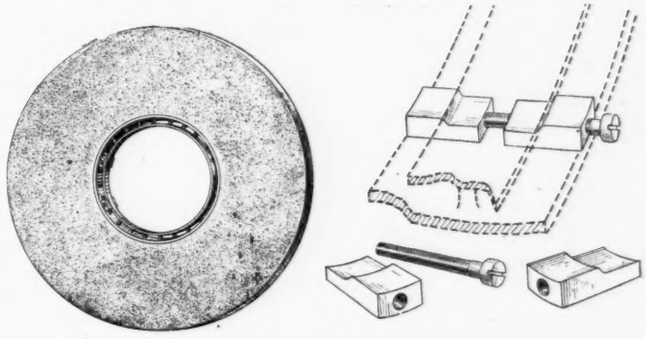


Fig. 3—Norton method of balancing large diameter wheels

Cutting Speeds

Surface speed is an important factor, and as the wheel wears down and becomes reduced in diameter its speed of revolution is often increased to make up for the reduction in its circumferential speed. In cylindrical grinding a change in work speed has the same effect. Operation at a lower speed gives somewhat the same effect as a softer wheel and often complaints are made that wheels seem to be getting softer toward the center, when the only difference is that the circumferential speed is lessened. The following circumferential speeds are recommended by the Norton Company:

Kind of Grinding	Circumferential Speed in ft.p.m.
Cylindrical grinding	5,500 – 6,500
Snagging and general off-hand grinding	5,000 – 6,000
Surface grinding	4,000 – 5,000
Knife grinding	3,500 – 4,000
Wet tool grinders	4,000 – 5,000
Vertical spindle surface grinding	4,000 – 4,500
Elastic and rubber cut-off wheels	9,000–12,000

Balancing of Wheels

Vibration increases the wear of the wheel and should be kept at a minimum. It depends in part upon the rigidity of the machine and in part upon the balance of the wheel. All grinding wheels are balanced by the manufacturers, usually by chipping holes near the bushing on the light side and filling them with lead. As the wheel wears it becomes unbalanced again and must then be rebalanced by the user. The reason for this is that wheels, as generally made, are not of uniform density throughout. A wheel which is considered out of balance will cause chatter marks on the work. In rebalancing, it has been the custom to either remove some of the original lead counter weight or else, if the plane of unbalance is found to lie at an angle to the original plane of unbalance, to chip a new hole and fill it with lead. This method of rebalancing has not been found entirely satisfactory, and efforts have recently been made, particularly by the Norton Co., to devise an improved method. This development work has not yet been concluded, but one method for balancing wheels with 5 in. holes has been introduced in practice. It consists in the use of a cast bushing securely fastened in the

wheel and provided with detachable lead weights, which can be moved circumferentially around the bushing (See Fig. 3.) Balancing is done on a pair of balancing ways, the wheel being placed on an arbor which is placed on the ways. A chalk mark is made on the side of the wheel which comes to the top, and the lead balancing weights are then secured to the bushing on that side. In no case should less than two balancing weights be used. By moving the two weights farther apart, the balancing effect is reduced. It has been found a very good plan to have all balancing of wheels in a plant done by a single man who will thus acquire considerable skill in the operation. The wheels should be balanced when returned to the tool crib and also when given out again, as they get out of balance when put away wet.

Truing and Dressing

A lathe tool must be sharpened and reforged occasionally, so also a grinding wheel must be reconditioned periodically. There are two methods of reconditioning grinding wheels, known respectively as truing and dressing. By the former the wheels are given their exact geometrical shape, while the latter method serves merely to give the wheel an approximately cylindrical form, and to roughen the surface and thus improve the cutting properties. Dressing is of little use in connection with wheels for precision grinding but is valuable in reconditioning wheels used for snagging and other rough work.

Corundum, one of the natural abrasives used in grinding wheels, is next to the diamond the hardest mineral known, and, therefore, diamonds are depended upon mainly for truing up the wheels. The diamonds used come from South Africa and Brazil and they come in various grades. Their color varies from pure white to black through all intermediate shades. In the selection of diamonds for the truing of grinding wheels, hardness is not the only factor to be considered; the hardest stones are usually brittle, and are therefore easily ruined by careless use. One maker recommends the use of brown bort stones as possessing the greatest number of desirable qualities. The diamonds are mounted in the holders either by peening, by brazing or by casting the holder around it. It is preferable that the diamond should be completely supported by the metal of the mount, without air spaces at any point, as it will then be best protected against breakage. This can best be effected by the cast mount. Either cast steel or some special metal of somewhat lower melting point is used for the purpose. Peening is a very delicate operation that requires great skill. Some grinders think that the high temperature of the molten steel injures the diamond. Whatever metal is used for a cast mount, it must contract strongly in cooling, so it will get a firm grip of the diamond. Silver solder is sometimes used for this purpose.

When a diamond is worn down to the metal setting it is reset so as to bring a new cutting surface into use. The size of the diamond should depend upon the size of the wheel. When the stone is worn down to too small a size it can be reset and marked for use in the tool room. In dressing a wheel, light cuts must be taken and the stone not jammed into the wheel. Diamonds are very hard and brittle, and for that reason must be handled with extreme care. A copious stream of water should be directed on the diamond at the point of contact with the wheel, except on the smallest sizes of soft wheels which may be trued up dry. For precision grinding the wheels are preferably trued with a diamond.

Truing for High Finish

In truing the wheel the diamond must always be rigidly held in a tool post which by means of a slide can be fed across the cutting face or faces of the wheel. By means of a diamond with a rounded point it is possible to true up a wheel in such a way that it will give a very smooth finish. Thus the same wheel may be used to remove metal rapidly and to give a high finish to the piece worked upon. By passing the diamond over the surface slowly, a smooth and true surface is obtained. This surface, however, is more or less unnatural on the coarse wheel, and great care must be exercised in applying the wheel to the work, so as not prematurely to disturb it. If the wheel is to be used for roughing again, all that is necessary is to take a deep cut.

For fine and dense wheels used for cylindrical grinding a sharp diamond is recommended, as this will somewhat roughen the surface, thus improving the cutting action if the wheels have a tendency to be too smooth. A round holder for the diamond is considered preferable to a rectangular one, as the holder may then be reset to a different angle at frequent intervals so as to cause the diamond to present a new cutting surface to the wheel. Silicon carbide wheels wear out a diamond more rapidly than aluminous wheels, because of their greater hardness, causing greater wear.

Cutting Fluids

In practically all precision grinding a jet of coolant is played on the wheel close to the cutting surface, grinding machines being always provided with the necessary reservoirs, pumps and delivery pipes. The chief object of the fluid is to keep the working surface at a uniform temperature, so there can be no heat distortion of the piece being worked upon. The fluid also keeps the wheel clean and therefore free cutting. While plain water is being used in some instances, it has the disadvantage that it tends to cause the machine and the work to rust. Sal soda and lard oil or grinding compounds are added to the water to prevent rusting. Internal grinding is often done dry, because the fluid would tend to form with the chips a paste which would clog the wheel and impair its cutting action. On bronze a thin oil or kerosene is used as the cutting fluid. When grinding cylindrical work the water spout must almost touch the work and stand away from the wheel about ¼ in., except on work having a spline in it, when it is necessary to move the spout farther away from the wheel.

Causes of Trouble

When trouble is experienced in grinding it usually comes under one of the following five heads, and the possible reasons of each kind of trouble are those given:

Wheel does not cut—Speed too high; wheel too soft; wheel of too fine grain; wheel is not the right kind as regards abrasive used.

Wheel wears away too fast—Wheel speed too low; wheel too soft; grain too coarse; too much vibration; pressure of wheel on work too great.

Unsatisfactory finish—Grinding surface of wheel not true; surface not sufficiently smooth; machine spindle vibrating; wheel out of balance; wheel too coarse; use of vitrified or silicate instead of elastic wheel.

Wheel loads—Surface speed too low; wheel grain too fine; wheel too hard.

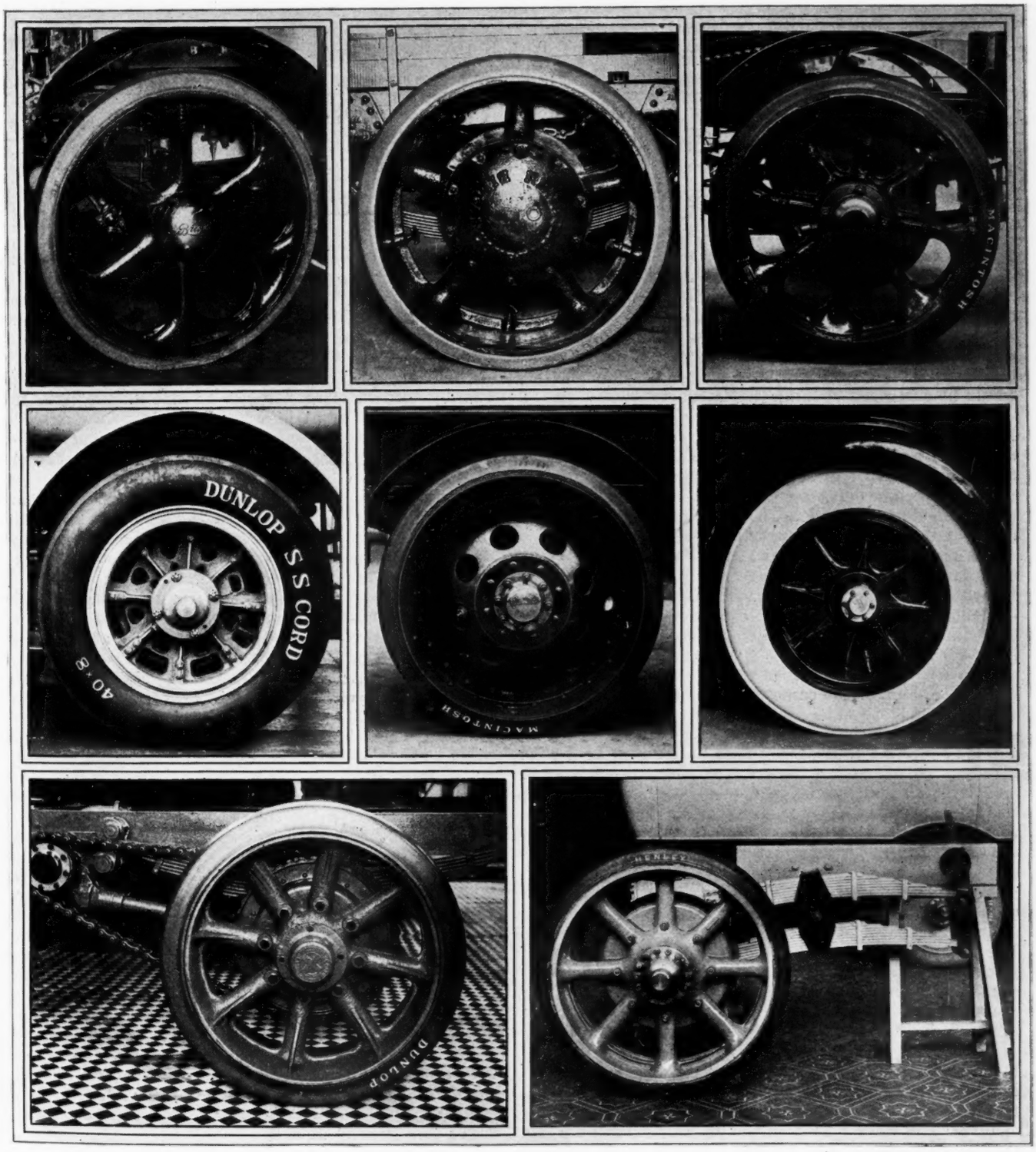
Wheel glazes—Surface speed too high; wheel too hard; wrong kind of abrasive.

The remedies for all of the above troubles are self-evident.

In all grinding work it is a good plan to take advantage of the expert knowledge of the organizations of the wheel and grinding machine makers in determining the best kind of abrasive grain and grade of wheel, as well as in settling other puzzling problems. In reordering wheels

the greatest care should be taken to give correctly all dimensions of the wheel, giving a sketch of the shape if same is special; the make of machine on which the wheel is to be used, the grade and grain, whether the wheel is to be of the vitrified, silicate or elastic kind, and the kind of abrasive. It is well to always retain the tag which comes with the wheel, as this will be found a help in re-ordering.

Eight Types of British Truck Wheels



Top row—(left)—The hollow spoked cast wheel of the Bristol; six spokes in both back and front wheels, with flat flared ends. (Center)—Renault cast steel wheel with hollow spokes and epicyclic final reduction gearing enclosed in hub. (Right)—Straker-Squire hollow spoked cast wheel with "tulip" ends against the rim. Center row—(left)—Web cast wheel of Daimler truck and bus chassis. (Center)—Thorneycroft double disk wheel. (Right)—W & G built-up wheel, with hollow pressed spokes, fitted to 2½ ton truck and charabanc chassis. Botton row—(left)—Hollow spoked wheel of Caledon chain-driven model, with side webs between spokes and rim. (Right)—Palladium hollow spoked cast wheel with circumferential webs uniting the spokes at the rim end. View also shows dual cantilever springs optional with this 4 ton chassis

Combining Quality with Efficiency in Fender Enameling

Special attention to equipment and methods makes the enameling department described here worth study. Twenty-eight electrical recording instruments maintain accurate control of oven temperatures. Ovens are equipped with conveyors which carry fenders through drying process.

By J. Edward Schipper

AN expert enamel man can almost tell the quality of an automobile by looking at its fenders. In no other part of a car is it possible to slight the work and yet produce a passable result which in nine out of ten instances would pass inspection by the casual and uninformed observer. The average man in the automobile business or out of it who is not posted on enameling would be surprised to think that a concern would install 28 recording instruments, costing nearly $500 apiece, for the sole purpose of maintaining accurate and exact control of the oven temperatures. This represents only one small detail of the expense which has been gone to in the enameling department utilized for the finishing of the Packard radiator shells, bonnets, fenders and a great many of the small parts for its cars.

The enameling department at the Packard factory has been laid out to produce fenders for 100 cars per day. It has been put on the two top floors of the factory; namely, the sixth and seventh, so as to be above the city's dust line. All of the sub-departments are separately inclosed in glass, so there is a minimum chance of dust circulation through the rooms where the work is being carried on, and, at the same time, good light is provided.

Parts which are to be enameled arrive at the enameling department both from the Packard company and from outside sources. It is almost true to say that in a walk through the enameling department not a brush was to be found; as a matter of fact, there are two brushes in the department. One of these is used for putting oil on a certain small part which is subsequently drilled, and the other for a purpose just as far removed from the actual enameling operation.

After the material reaches the enameling department, the first operation is preparing it for the enameling operation. The parts are boiled in potash for 10 minutes. The solution of potash is made up of 35 lb. of potash to each 100 gal. of water. This solution is sufficiently strong to clean the part ready for rinsing. The parts are then put through a Niagara washing machine, first being washed with an Oakite solution to neutralize the potash and then with clean, hot water.

Following the washing operation, the entire surface of each part is emeried off by hand and then polished on regular metal polishing machines operated by electric motors. The wheels used on the polishing machines are the No. 7 Alundum, which take off all the rough spots. This cleaning operation puts the part in condition for the priming coat, consisting of a No. 489 Arco primer, which is sprayed on. The parts are then baked for an hour at a temperature of 400 deg. in electric ovens.

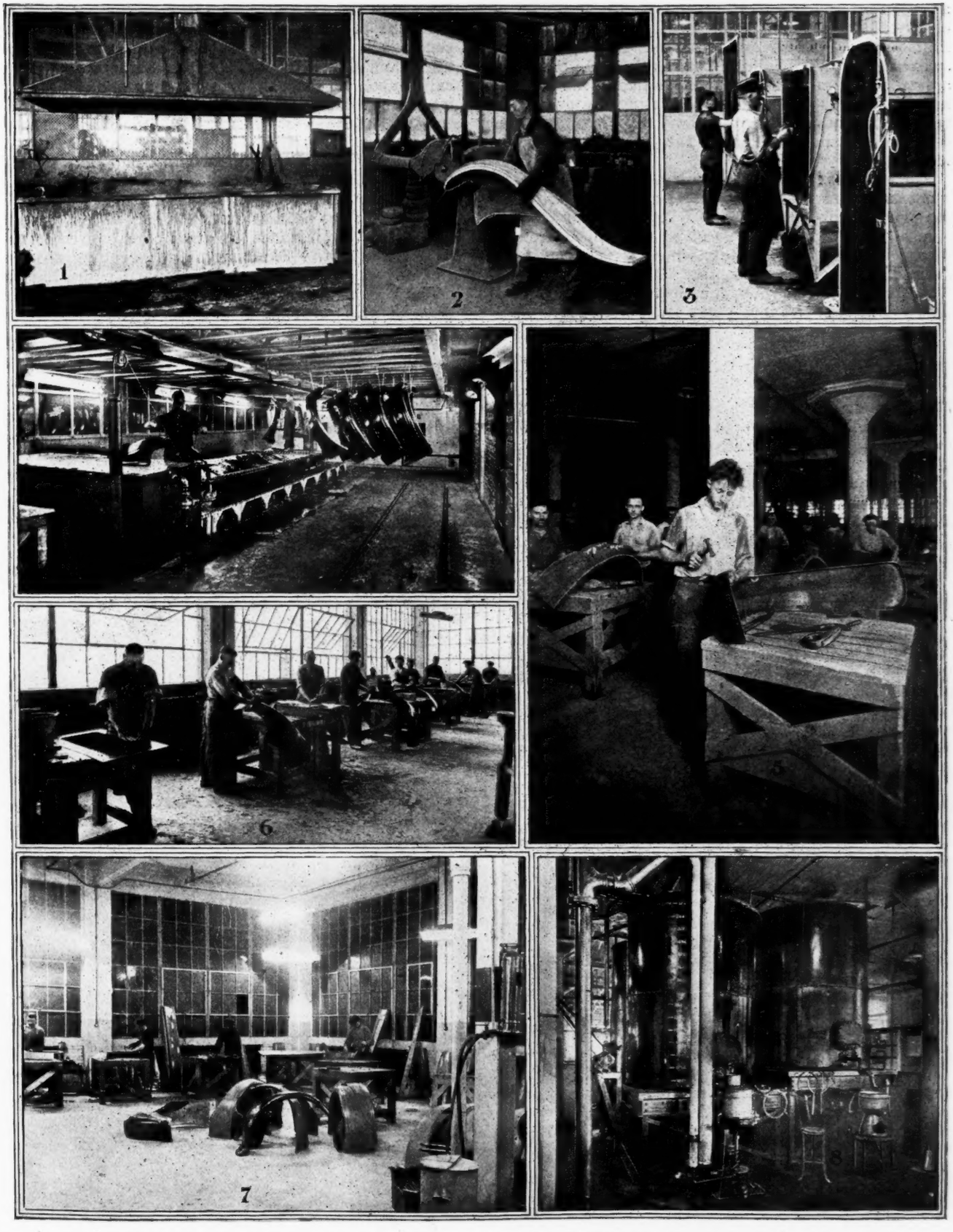
These electric ovens, of which there are 16, are the product of Young Bros. They are all equipped with Palmer-Bee conveyors, so that at no time is it necessary for a man to enter an oven. The conveyors are the endless type and the ovens are double-ended, so that it is possible to load at one end and remove from the other without any waste of time; that is, the conveyor simply carries the material through in one direct line, first starting at the point at which it is loaded, making its first stop at the center position, or in the oven, and its last stop at the unloading position at the opposite side of the oven.

After the priming coat has been baked hard, the parts are sandpapered and taken to the bumping room and then back to the polishing machines. This removes all of the rough spots and irregularities detected after the priming coat is rubbed down.

After the parts have been thoroughly cleaned, dried with an air hose and wiped, they are sprayed with a coat of No. 409 Arco filler, and again baked at a temperature of 400 deg. Fahr. for one hour. They are again sanded smooth with a No. 0 "3 Mite" cloth. After this they are wiped off with what is known as a "tack" rag. This consists of a cheesecloth which has been soaked in ordinary varnish and allowed to dry until it becomes tacky. When wiping the parts with this, the tackiness of the rag causes all of the dust particles to adhere to it, leaving the part perfectly clean. This operation prepares the part for the two coats of enamel, known as first coat enamel, a 28 gravity product. This gravity has been found best for this work. Both these coats are baked at 400 deg. for one hour. They are, of course, given a low heat for a short time before the top heat of 400 deg. is put on. The low heat generally ranges about 250 deg., allowing the enamel to take a secondary flow, as during the time the parts are being hung up on the conveyor before they enter the ovens they become partially dry.

The two coats of first coat enamel are rubbed to a perfectly smooth surface with pumice, felt and water and are then washed off clean and the moisture blown off with an air hose at a pressure from 70 to 80 lb. The parts are again tack-ragged and dipped into the finish enamel. This enamel also is an Akron enamel, being mixed to a gravity of 27½.

In carrying on this work the Packard company has in its equipment 10 spray booths. Both the gravity feed and cup spray are used. The spraying device is the DeVilviss Spray Aeron. To accurately maintain the heat of the ovens 28 recorders are installed which automatic-



1—Tank in which the parts to be enameled are boiled in a potash solution for 10 min. They then pass to a Niagara washer, which is shown just to the right of the potash tank
2—Cleaning fenders to be enameled on electric polishing machines with No. 7 Alundum wheels
3—Spray booths used for spraying on priming and finish coats of enamel. No brushes are used in the enameling work
4—Parts are hung by hooks on Palmer-Bee conveyors and rolled into the Young Bros. electric ovens shown herewith.
5—Going over the surface of the parts to be enameled and perfecting minor irregularities.
6—Rubbing stands for hand rubbing the priming coat
7—Cleaning and tack ragging enamel parts preparatory to receiving the finishing coat
8—Filtering tanks for enamel. Left, De Laval separator for priming coat, and right, tank with Empire separator for finish

ally control the temperature and record it. They are electrical instruments made by Leeds & Northrup of Philadelphia. They are arranged for automatically switching from low to high heat as desired. The mechanism is so arranged that it automatically times the low heat as well as the high heat, starting the oven at the temperature desired and then switching it to the higher temperature, and at the end of the desired period cutting it off.

For the preparation of the enamel there is a filtering plant equipped with a De Laval special separator for the priming coat and an Empire separator for the finish enamel. The enamel as received is pumped from the drums into the mixing tank, where it is mixed to the desired gravity with turpentine. It is then drawn into the filtering tanks, where the separators purify it, and finally it is pumped into tanks from which it is drawn for use in the enameling operations.

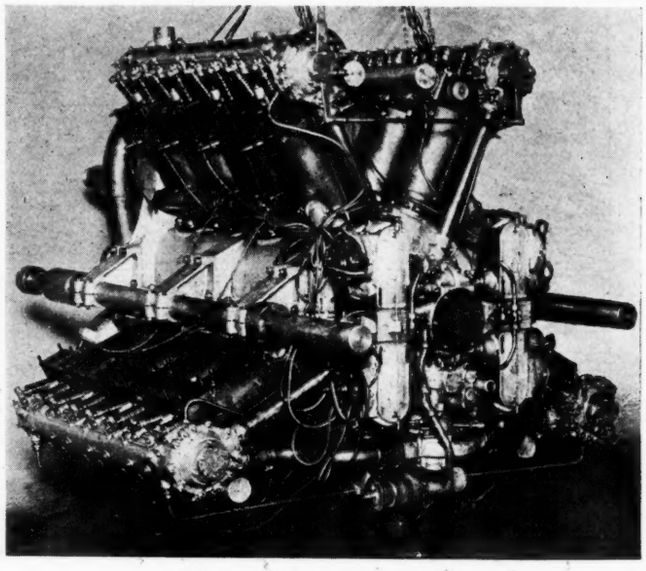
At the present time this department of the Packard company is employing about 130 men and is busy with night and day shifts. This is a department which is called upon very largely for service as well as production work, and consequently is not so much affected by fluctuations in the retail business as other departments of the factory. Running at the 100-per-day schedule, the department employs about 240 to 260 men. It is distinguished by its rigid inspection and the time and care required of the men for the performance of each operation. There has been no attempt to speed up the dipping operations, for instance, as great care is used to eliminate air bubbles. Similarly, in the rubbing down and cleaning operations, no extraordinary effort has been made to shorten the time, as the work is gaged by its thoroughness rather than upon its speed.

Some European Aircraft Items

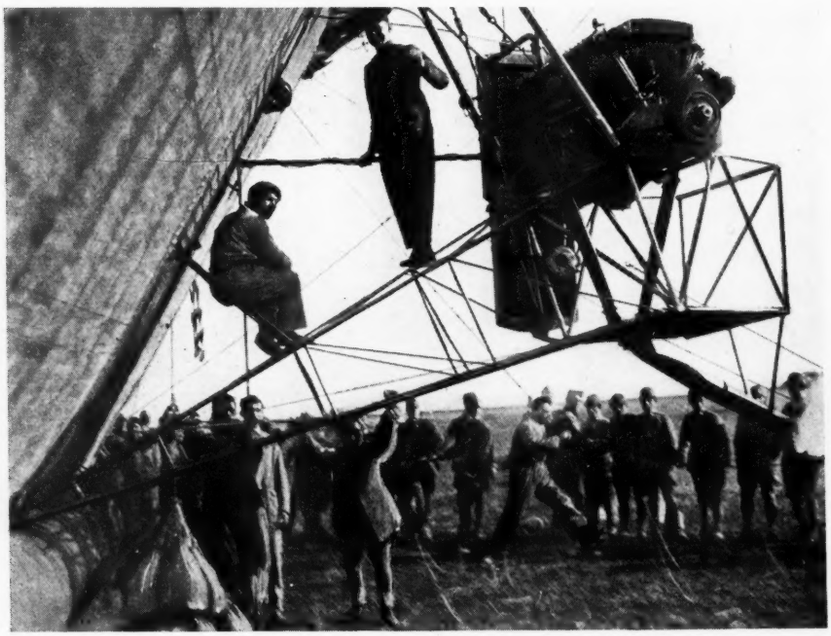
THE engine shown in the accompanying cut is said to be the highest powered single unit aircraft engine ever built. It has sixteen cylinders arranged in four blocks of four each. The angle between the lower blocks is much wider than that between the upper pair. The engine was constructed for the British Air Ministry by D. Napier & Son, Ltd. It is reported to have developed 1,057 hp. and to weigh slightly over two lb. per hp.

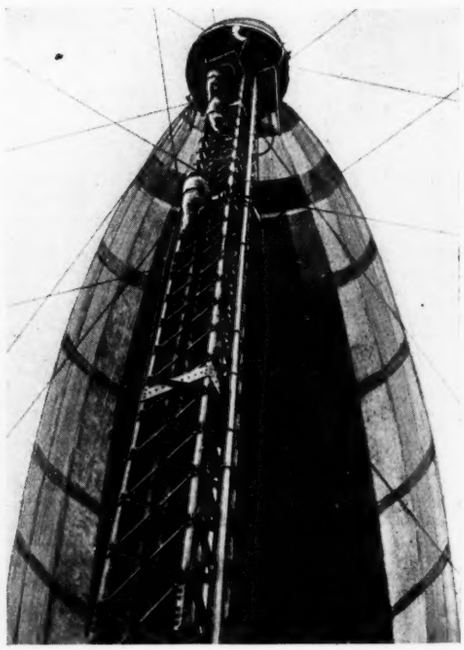
Below at the left is shown a view of one of the powerplants used on the Italian dirigible "Roma" purchased not long ago by the United States and turned over to the American Air Service officers sent to Italy to dismantle the ship and bring it to this country. The "Roma" is said to be the second largest semi-rigid airship in existence. It is 410 ft. long and has a cruising radius at full speed of 3,300 miles. It was purchased from the Italian Government for the sum of $200,000, and it is said that it would cost $1,250,000 to duplicate this dirigible in this country.

Below at the right is an unusual photograph showing the crew of the British dirigible R-33 boarding the great ship via mooring mast used as an anchorage. The photograph was taken at Pulham Airdrome, England.



1000 hp. Napier aircraft engine





At left, powerplant of the Italian dirigible "Roma" recently purchased by the U. S. Government. At right, Crew boarding the British dirigible R-33, which is tied to the mooring mast.

Selling American Cars in Spain

Here is a close-up on the automobile situation in Spain. It is written by a man who has just spent several years there selling American cars. He points out defects in past American methods and tells in graphic fashion the difficult conditions met with in selling to the Spanish market.

HAVING spent about eight months in Spain, I think I am in a position to review the present status and prospects of American cars in that country. I have made the acquaintance of dealers in all parts of Spain and have discussed their problems with them.

Spain offers one of the best markets in Europe for American cars, since it has comparatively few cars per person. Traveling through the rural districts one seldom meets automobiles, while the density of cars in the cities is similar to that in the United States 15 years ago. There are many more horse driven than motor vehicles. In other words, Spain is still virgin territory as regards the sale of automobiles. Despite the fact that there are still comparatively few cars in Spain rapid strides have been made during the last few years. There are now between 35,000 and 40,000 cars, while the population is about 22,000,000.

It is hard to understand the attitude of the Spanish public toward automobiles. Both rich and poor are antagonistic. Cars are not used primarily as a means of transportation; they are merely playthings of the rich. The poor people still consider them devil cars and throw stones at them. Many a rich man has a feeling against cars, because they scare his horses and because automobiles force more activity in the general Spanish life. To understand this attitude it is necessary to understand something of Spanish character and modes of living.

MANY special conditions must be considered in selling cars to Spain. "No real Spaniard," the author says, "is ever in a hurry. The Spanish people do not take to new machinery. The Spanish purchaser always believes someone is attempting to cheat him. The Spaniards are inveterate bargainers."

No real Spaniard is ever in a hurry. Most of them take their daily siesta, while the others at least take several hours for lunch and one or two hours afterward for coffee. Spain, in general, is many, many years behind its neighboring countries in development, and it still resists progress and new ideas. The difference between France and Spain is noticeable as soon as one crosses the frontier. In France one notices many automobiles, trucks, tractors, factories and farmers cultivating every inch of land, while on the Spanish side of the frontier one is immediately impressed by the absence of such activities and by immense areas of uncultivated country, the use of oxen, the Roman wooden plow and general lack of activity and cleanliness.

The Spanish country people do not take to new machinery. As a matter of fact, they resent being disturbed by the active salesman who tries to make them see the advantages of his product. The Spanish purchaser is by nature suspicious. He always believes that one is attempting to cheat him. The salesman who names his lowest price immediately has made a great mistake, for the Spaniards are inveterate bargainers and always want to pay less than the price first asked. I have seen instances where it took three weeks to adjust a difference of less than 1 per cent in the price asked. We would consider this wasting $1,000 worth of time to make $10, but the average Spaniard considers time the cheapest commodity and regards it as worth nothing.

Before one can do satisfactory business with a Spaniard, one must have his confidence. To make one's self liked and to gain this confidence is accomplished only by slow means. It takes many weary hours' talking about the bullfight, the weather or politics before one dares to begin to discuss business with the average Spaniard. Once the Spaniard has confidence, however, one can sell him nearly anything and he will be interested in any proposition one puts up.

To foresee the future of the automobile business in Spain it is necessary to review the past. Up to the outbreak of the European war, French, German and English cars were sold almost exclusively. Very few American cars were used and American products were viewed with suspicion, chiefly because they were too cheap. The few American firms that did enter the market went about merchandising in the wrong way. The other foreign cars were of the most expensive type, used mainly by the very rich in the cities. The cheap car was practically unknown.

During the war, when it was impossible to import cars from European countries, nearly every automobile agent tried to secure the agency of some American car. Neither the ability of the agent nor the reliability of the factory had anything to do with the establishment of relations; agencies were established everywhere. Every rich father gave his son a few thousand pesetas to set up in business as an automobile agent. Selling cars was considered the proper work of the idle rich, since it allowed the rich young men to run through the streets in their demonstration cars and have a very good time. Such agents, of course, sold a few cars and never thought it necessary to carry spare parts or give service on the few that were sold. Naturally, great harm has been done, and many good American cars now have a bad reputation in Spain.

The real agents, who were established and had service stations, had great difficulty obtaining cars from American factories. Very little attention was paid to these real agents by the Americans. Conse-

quently, many of the agents became disgusted and cancelled their agencies. Others kept on and had all kinds of trouble. Cars were shipped in poor condition and not in accordance with specifications. American companies shipped incomplete cars, and the agent had to wait sometimes three to six months to get the missing parts. Notwithstanding all these difficulties, American cars won out because of their inherent merits; certainly not because of the efforts of American factories.

American cars had self-starters, electric lights, and went up any hill on high—qualities unknown in the European cars. Moreover, American cars were cheaper.

The result is that to-day about 80 per cent of the cars in Spain are American. Especially during 1920 was our business with Spain very large, although it fell off in the fall. During that year the import duty was rather moderate—one peseta per kilogram, payable in gold at a premium of about 40 per cent, while the exchange also was not greatly above normal. During 1920, moreover, the great fortunes made in Spain during the war were being liberally spent. Since then conditions have changed entirely.

In the fall of 1920 a good many of the war profiteers' fortunes had been spent. Most of the people who made this money never had been in business before and lacked the knowledge to continue their operations. Consequently, they began to liquidate their belongings; among the first to go were automobiles and pianos. Thus a great many second-hand cars were thrown on the market.

AMERICAN cars are gaining popularity in Spain because they possess qualities not inherent in other foreign cars. American manufacturers have not handled Spanish dealers properly, however, and success has been in spite of the methods used. Haphazard selection of agents has been one important hindrance to greater sales.

At the same time credit began to be tight. Banks refused to loan money as readily as they had before. Loans were called, and automobile dealers had difficulty in financing their shipments. The Banco de Barcelona had to close its doors. Catulana, the richest and the only industrial part of Spain, was thereby thrown into a panic. The effect on all business was instantaneous, and depression followed rapidly. To make matters worse, the Spanish Government thought to increase the declining value of the peseta by preventing imports, and on November 28, 1920, after giving 24 hours' notice, increased most of the import duties by 200 per cent.

The effect on the automobile industry was instantaneous. Ford increased the price of its touring car from 4,500 to 8,500 pesetas. The average small American car selling for 13,000 pesetas had to be sold for 18,000 pesetas. There was much confusion; everybody was trying to unload; dealers having stock before the buyers became scarce and scared. Moreover, the government unofficially spread rumors that the new duties were only temporary and would be lowered soon.

The Seville agent of a well-known, popular, low-priced car made in America, for example, sold 80 cars from Sept. 1 to Dec. 1, 1920, and then sold but one chassis and one sedan from then to April 1, 1921. All during the winter business was stopped. Spring brought no buying movement; very few cars have been sold even during the summer.

Ford, who was assembling cars in Cadiz before Nov. 28, 1920, at the rate of 25 daily, closed his factory, although I understand parts for 2600 cars were in stock on which the duties had not yet been paid. It seemed that every month conditions were worse. All seaports were loaded with cars and trucks and agricultural machinery. Germany dumped its stocks in Barcelona, France in Irun, and England in Bilbao. In Barcelona alone I have seen over 1500 cars and trucks on the docks on which duties had not yet been paid, most of them in bad condition, tires missing, leather rotting, etc. The dealers had no money to take these cars away, the banks refused loans.

The long-awaited duty revision came last May, and, as far as I can find out, is again only provisional until such time as an international conference will establish reciprocal tariffs. The new duties, however, are about three times as much as the previous ones and practically close the Spanish frontiers. The new duties are approximately as follows:

On chassis, until 1000 kilos, 20 per cent of the value.

On chassis, more than 1000 kilos, 30 per cent of the value.

Open bodies, 20 per cent of the value.

Closed bodies, 35 per cent of the value.

Spare parts, from 25 to 35 per cent.

All these duties are payable in gold, which means about 40 per cent premium. There is also a duty on transportation and expenses which amounts to about 5 per cent.

Small American cars can still be imported when the market opens again. I am investigating the possibility of importing parts and assembling cars in Spain, which seems to be the only chance of doing business there, although it might not be advisable until such time as the duties have been revised definitely. Should this be possible, it might mean large business.

As regarding the future of consumption of the Spanish automobile markets, I believe that Spain will some day take a large number of American cars. It is doubtful how soon this will be, but the time will come. A good deal, of course, depends upon how strenuously and intelligently the American manufacturer develops this market.

The use of automobiles in any country, however, depends a good deal on the following factors:

1. Conditions of roads.
2. Facilities for the use of cars.
3. Popularity of cars.
4. Financial ability to purchase.

The situation in Spain as regards these factors can be readily analyzed.

Roads

The roads in Spain are atrocious. There is one rather good road from Irun, San Sebastian, to Madrid, but woe to the poor motorist who goes anywhere else, especially during the fall, winter and spring, when considerable rain has fallen. The roads are a continuous series of mudholes. I have seen a real lake of mud on the main road from Madrid to Barcelona, 20 miles before entering the latter. In the South the roads are generally bad, very rutty in the rainy season and dusty in summer. In the summer, dust is an inch deep in most Spanish roads, and in the winter one usually has as much mud on the

top as under the mudguards. The Spaniard knows, however, how to make good roads. A few years ago a new road was built over the mountains, near Seville, of which any country might be proud, but usually good roads are the last thing the politicians think about, and, when they do, the coffers are empty. There is absolutely no public demand for good roads; the newspapers never mention them, and the term "good roads" is practically unknown.

The present roads consist mostly of clay. They date back to the time of the Moors, and are very broad and flat. There is no foundation to most of the roads and water will not run off them. New surfaces are made by dumping stones on top and crushing them down with a road roller. Sometimes a roller is not used, and the stones are allowed to lie until they are naturally crushed into the old surface by the traffic. Mule carts, with very large, thin wheels making a wide track, constitute the bulk of traffic on Spanish roads. It is possible to go 500 miles without meeting one automobile, and the passing of a car through any village is an event. So far as I know little road improvement is contemplated by the present government.

Facilities

The facilities for the use of cars are so poor as to be almost unbelievable to the average American. In the few big cities there are garages and shops, but only in Barcelona and Madrid is one able to get tires of all sizes. In Madrid, as well as in other cities, gasoline is sometimes very difficult to obtain. In the garage where I kept my car, for example, it was frequently necessary to make a daily allotment of two litres per car because of lack of gasoline. This was mainly due to railroad conditions, which are rather deplorable in Spain. Gasoline is always sold in cans of 5 to 18 litres, costing about $1 per gallon. The quality is poor.

Most of the gasoline is refined in Bilbao and other seaports, and the supply is mainly controlled by the trust, which maintains prices, and cannot yet see that cheap gasoline would increase the use of cars. Most of the small cities never have gasoline at all, while those that do have it sell it by the bottle in drug stores. In Granada, for instance, a city of 100,000 people, I was forced to buy gasoline last spring in a drug store and pay nearly $2 per gallon. In the villages cars are unknown and garages are, therefore, scarce. There are sometimes distances of over 150 miles without anything in the way of gasoline, oil or supplies, but one gets used to this condition and takes everything along. Accessories in Spain are very antiquated, and even in Madrid I could not find one shop where they were really in a position to repair a generator. Electricity, as far as automobiles are concerned, is still in its infancy. All of this makes motoring rather difficult and expensive in Spain and naturally hinders sales.

Popularity

As far as popularity of automobiles is concerned, I have already discussed the unpopularity of automobiles in the cities. The average man in the cities, perhaps, has the idea of owning a car sometime, but in the country people don't see why anybody should have one. I believe if a doctor in a small village would purchase a car he would lose his clients, unless he could immediately prove its utility.

Owning a car in Spain means being so wealthy that one can throw the money out of the window. The automobile is not considered as a means of transportation at all. It is still an article of luxury, and I am afraid it will be so for a long time to come.

It is true that Ford has made some inroads on this theory, and, by placing agents throughout Spain in even the smallest cities, has succeeded in at least making the Ford car be used as a transportation medium. In the cities the distances are not very large, and business men have not yet learned how to use a car in their business activities. Furthermore, the use of a car in the big cities is something of a nuisance and rather dangerous. The Spanish people since time immemorial have been used to walk in the middle of the streets. The average Spanish street is narrow, and the people will not change their habits for the automobile. There have been so few real accidents in the big cities that the people do not realize the danger of cars. On the business thoroughfare it is not unusual to see a man cross the street reading his newspaper and no amount of sounding the klaxon will make him budge. It is also rather dangerous to leave one's car outside unattended; usually one finds his tools or spare tire gone. Cars are seldom stolen. There is a special purpose in stealing spare tires. They are sold in the country, where they are cut up in sections the lengths of shoes and used as shoes by lacing the ends together over the foot.

Another thing which makes motoring in the cities unpleasant is the police activity. To explain this, let me first explain the licensing of cars. Inasmuch as all cars are imported, in order to license one it is necessary to have a receipt of the customs house, furthermore a bill of sale, then to make an application to the governor of the state in which one lives. Then after a while the car is inspected by the government engineer. With his certificate, one has to go to another office and wait until they give the number of the license. Then one has to have the plate made. The shortest time on record for accomplishing these formalities is eight days, but usually they take two or three weeks.

The license number has the first letter of the province in the front, so if one goes from Madrid to Barcelona, in order to drive there one has to get a special permit. Of course, the price of all this is high. Dealers have recently obtained the privilege of licensing their own cars without paying the taxes for same and, later on, when the car is sold, transfer the number to the customer, who will pay the tax. The trouble is that the municipal police, probably on instructions from men higher up, do not recognize these licenses and make all kinds of trouble. They told me several times that mine was only good from 6 until 10 in the morning in the park, after that the car had to go to the garage. Once when I had left it in front of a theater at night, they actually paged me and forced me to take it back to the garage.

Life is rather dull in Spain, however, and little things like this make it interesting. After the killing of Sr. Dato by some syndicalists on a motorcycle, the order was given that no car leave Madrid without a special permit. I had a demonstration to give in the country, but with my dealer's license there was no way of getting out. It took everywhere from one to three hours to get the permit, which was only good for that special day. This made it rather hard on people living in the country and coming to Madrid every day. This order has since been revoked, but a new one is in effect, and within a circle of 100 km. from Madrid there are from five to seven police posts, stopping all cars, forcing everybody inside to show passports. The owner must show his license, and the driver his driving permit. This is supposed to be all written down on special blanks, but inasmuch as most policemen do not know how to write their own name, and the blanks

are usually missing, I have seen them write the information down on the edge of a newspaper.

Another point of difficulty is the filling of cars with gasoline; I have seen three pumps in all of Spain. The other places all use cans, an extremely slow method. Tire pumps are practically unknown; free air does not exist. When my cars arrived in Cadiz it was impossible to find a garage that had even a hand-pump which would work.

Ability to Buy

An examination of the financial ability of Spain to purchase cars indicates that there will never be as many cars to the population as in the United States. There are three classes in Spain, the rich, the middle class (shopkeepers, etc.) and the working class. The others are mere beggars. The term working class includes the farmers. Farmers very seldom own their own land and, when they do, are not progressive enough to make it produce on a large scale. They produce just sufficient to keep themselves alive. The rich class purchases cars, the middle class very seldom makes enough money to do so and the working class never will. Even when salaries were highest, workmen made about 15 pesetas daily, or $2, which is not enough to even buy a car on installments, especially considering the large size of the average Spanish family.

At present there is no purchasing power in the country. Credits are curtailed and there is a great crisis in all industries. Textile factories, mines and a great many other industries have no work to offer. Due to the duties and also to monopolies, prices are exceedingly high, and the country is really passing through a severe period.

Notwithstanding all these unfavorable circumstances, I foresee a great future for the American exporter of automobiles in Spain. As soon as exchanges are more normal our prices will be such that no French manufacturer can compete. The French have lost much ground and will lose more. Some day or other the normal trend of business will come back. Spain may have to go through some severe disturbances before this normal period arrives, but it is bound to come, nevertheless.

Spain, in my opinion, is the richest country in Europe. It has every natural advantage—climate, soil, minerals of all kinds, gold, silver, iron, copper, marble, sulphur, etc. It has enough water power to carry on its industries without ever using another ounce of coal. At present, however, it has enough coal to supply its own needs and to export a considerable tonnage, provided the Spaniards would work. Last year, nevertheless, they had to import coal. What Spain needs is to wake up and go to work. This will not occur, though, for many years to come. Spanish capital is not interested in developing its own industries. The average Spaniard with money will buy bonds and live on his own income rather than ever do any work again. Foreigners must bring in their money to develop the country's resources. This is being done on a large scale and very successfully, as in the Rio Tinto copper mines. There are more opportunities in Spain to-day for foreign capital than in any other country in Europe or elsewhere.

American automobile manufacturers, if they desire to sell their products in Spain, must see to it themselves that they have the right kind of agent. Agents should not be appointed by correspondence. Once the manufacturer has such an agent, he should support him in every way.

One great disadvantage in Spain to-day with regards to the development of the automobile business is the more or less antagonistic attitude of the newspapers, the press, which has not yet realized the value of motor cars. Automobile accidents have headlines, with photographs, long descriptions and many sarcastic remarks about the danger of automobiles. But the papers never will make a favorable remark about a dealer's product, regardless of extensive advertising. I did, however, succeed in getting one Madrid paper to issue once a week a special page on automobile activities. American manufacturers should realize that by assisting their agents in this line they would be working for their own prosperity.

Foreign Cars in Spain

A detailed list of car registration in the districts of Seville, Spain, from March to June, 1921, presents an interesting side light on the foregoing article. This list is taken from the records of the Royal Automobile Club of Spain. The total of new registrations was 95, of which 40 were American and the remainder of manufacture in European countries. The foreign makes registered were:

Hispano	Renault	Ardic
Peugeot	Berliet	Union
Mercedes	Dixie	Sizaire
Excelsior	B. S. A. M.	Steyr
Citroen	Brennabor	Turcat Mery
Fiat	Rolls Royce	Unic
David	Charron	Itala
O. K. Junior	Stoewer	Rex Simplex
Hansa Loyd	Cormen	Benz
N. A. G.	Dion Bouton	Arbenz
Doby	Dux	
Rochet Schneider	Wolseley	

These thirty-four makes are of interest as showing the competition. The American makes were:

Wichita	Maxwell	Briscoe
Buick	Gardner	Cleveland
Hupmobile	Oakland	Ford
Paige	Studebaker	Overland
Haynes	Hudson	Chandler
Mercer	Dodge	King
Essex	Crow-Elkhart	Stutz

The number of American makes was 21—Overland with 7, the N. A. G. with 5, Fiat with 4 and Dodge, Citroen and Peugeot 3 each, were the leaders.

The gasoline price given was .80 pesetas per liter—or 60 cents per gallon at normal rate of exchange.

Packing and Crating Automobiles for Foreign Shipment

METHODS of packing and crating automobiles and trucks for foreign shipment have not yet been standardized, but excellent methods have been developed in the practice of certain concerns with considerable experience in this field. One chapter of a new book entitled "Export Packing" by C. C. Martin takes up the crating of cars and trucks and is illustrated with photographs of the packing used by several companies.

The volume is published by the Johnson Export Publishing Co. and is designed as a general guide for crating for foreign shipment. It is of considerable bulk, but has special reference to automotive work only to a limited degree. The author was assisted in writing several chapters by D. T. Abercrombie, formerly Lieutenant-Colonel of the Quartermaster Corps; H. N. Knowlton, formerly Captain in the Ordnance Department, and M. C. Fitzgerald, Manager of Transportation, General Electric Co.

Status of American Motor Vehicles in Japan

There are about 9000 automobiles in Japan. 70 per cent of these are American made. High import duties on finished cars have caused large importation of parts. Most bodies are made within the country. Special packing methods and other merchandising factors are discussed.

By Lester Schnare*

DURING 1920 1745 automobiles, valued at $2,425,518, and automobile parts to the value of $2,798,141, were imported into Japan. The total value of automobiles imported in 1919 was $2,757,473 and the value of automobile parts was $2,866,754. The number of automobiles imported in 1919 was 1579, which indicates that a larger number of medium and low priced cars were imported in 1920 than in 1919.

The value of automobiles and parts imported from the United States was $5,405,818 in 1919 and $5,015,130 in 1920. Italy exported automobiles to Japan amounting in value to $138,041 in 1919 and $9,889 in 1920. No other country had an important share in the Japanese automobile imports in these years.

In recent years the value of the automobile parts imported into Japan has exceeded the value of the automobiles imported, the excess being relatively much greater in 1920 than it was in 1919. This is explained by the fact that approximately 60 per cent of the motor vehicles imported into Japan are brought here as unassembled parts of cars and not as complete automobiles, a practice which is the result of a discrimination in the tariff in favor of automobile parts, together with the saving in freight charges that can be made by the closer packing. As a rule the chassis and other smaller parts are imported without the body, which is built in Japan.

Building Bodies in Japan

As a result of the discrimination in the tariff laws of Japan against complete automobiles there has developed a considerable industry in the manufacture of automobile bodies. Almost every dealer in automobiles in Tokio, where this industry has shown the most rapid development, has facilities for building automobile bodies to order and it is estimated that from 150 to 250 automobile bodies can be manufactured in Tokio each month. Many purchasers prefer to have the bodies for their own automobiles built in Japan, because it is possible to manufacture here a body that will accommodate seven Japanese persons, besides the driver, and mount it upon the chassis of a small car, thus effecting a considerable economy.

Automobile bodies constructed in Japan are usually made of wood. A small percentage of them are built of sheet metal, but as there are no dies for pressing sheet-metal bodies, they are made by hand, and the scarcity of skilled sheet-metal workers and the higher wages paid them limits the construction of this type of body.

It has been estimated that there are no more than 9000 automobiles in Japan, of which about 70 per cent are of American manufacture.

*American consul at Yokohama.

There can be no doubt of the popularity of the small car in Japan. Its initial cost is more nearly within reach of the average income and its upkeep is less expensive. Furthermore, a small car can be handled with greater ease and speed on the narrow roads and city streets than can a car with a long wheelbase and heavy body. The high price of gasoline and motor oil and the heavy prefectural and municipal taxes on high-powered cars are also contributing factors toward the desire for low-priced machines.

The outlook for the sale of automobiles in Japan during the present year is generally considered unfavorable. The business always reflects the condition of trade in other lines and the present business depression shows little sign of improvement in the near future. There are on the docks of Yokohama a large number of automobiles, imported last year, which have not been claimed by their importers because of financial circumstances and many importing firms have large stocks of machines which they have held over from last year due to lack of demand.

Selling Suggestions

An American automobile dealer of considerable experience in Japan suggests the following precautions, which it would be well for American automobile manufacturers to observe in preparing their products for this market.

Care should be taken in packing automobiles intended for export to this country. Too frequently they arrive in a damaged condition as a result of poor or insufficient packing. The dissatisfaction which this causes the importer is not helpful to American trade.

All steel parts of automobiles, as well as of other machinery, should be well greased before packing for shipment to Japan. This should include the interiors of the cylinders of motors. It is a common occurrence for a shipment of imported goods to remain upon the wharves in the customs compound of Yokohama for six weeks or more after being unloaded from the ship on which it arrived, because of delay in getting the goods passed through the customs. During this time the goods are often fully exposed to the weather, and this is particularly likely to happen if they are packed in large cases. The salt, humid air of the water front causes exposed iron or steel to rust very rapidly unless it is well protected by a thick coating of grease.

The fenders of automobiles intended for the Japanese trade should be given an exceptionally heavy coating of paint to keep them from rusting when used in cities and towns along the Japanese coast, where the air seems to be particularly destructive to them and gives the average fender a rusty and unsightly appearance in a comparatively short time.

A More Definite Statement of the Highway Research Work

It is an accepted theory that highways and their use are one problem and that this form of transportation is vital to the welfare and prosperity of the nation. Today it is an undeveloped subject. This committee is seeking fundamental information.

AT the recent conference of educators and industrial leaders called by the Highway and Highway Transport Education Committee, Prof. W. K. Hatt, director of the Highway Research Committee of the Division of Engineering, National Research Council, read a more definite statement of the work planned by his committee than has heretofore been made public. This report was referred to in the recently printed account of that meeting. The research work undertaken by this committee dovetails completely with the forward plans of the Education Committee, as the research must develop the information necessary for the proper education of the highway and highway transport engineer of the future.

The outline of the work undertaken by Prof. Hatt and his associates is still subject to change. The tentative outline presented at the meeting referred to follows. The committee invites suggestions.

By W. K. Hatt

INDIVIDUALS in industry who have endeavored to state the problem in approximate statistics tell us that there are 10 billions of dollars invested in self propelled vehicles, and that the turnover is three billions annually. That there are ten passenger vehicles to one freight vehicle, and that the problems of speed and safety are most important. That the annual expenditure for operation of vehicles is twelve times the annual expenditure on the roads; therefore the field of research on cost of vehicle operation arising from the road surface and from the vehicle itself, must be kept in the foreground. That transportation by self propelled vehicles is the most expensive of all commercial forms; it will increase. Everyone pays for efficiency.

For the purpose of a coordinated and comprehensive program of Highway Research, the writer has been endeavoring to bring into the picture all the elements of the situation in Highway Transport: Engineering, including vehicle and road; Economics of Transportation; Administration; Finance. Some comprehensive and logical assemblage will be helpful.

It appears that there are many dimly seen figures which should be advanced from the background; there is much that is unknown. We may ask a few questions which cannot be completely answered.

Fundamental Questions in Highway Transport

The Transport Unit

(1) What is the economical highway track unit for each of the several situations, e.g., intercity, farm to market?
What is the cost of transport arising from vehicle and from road?
(2) What is the relation of this economical unit to other systems of transport, e.g., electric and steam, in a unified system?
(3) To what extent, as a matter of public policy, should any transport unit be indirectly subsidized?
(4) What traffic regulations should be imposed on such economical unit over other types of road?
What fees should be charged for service rendered to vehicle by the road?
(5) What should be the proportion of the total traffic supplied by such economical unit to justify a special design of road for such unit?
(6) What prediction can be made of future changes in general traffic and what is the influence of these on the economics of the present situation?
(7) How should passenger traffic over the highway be evaluated?

The Road

(1) What type of road paving should be selected for a specified transport unit?
(2) If the road cannot be economically fitted to the truck transport unit, can the latter be modified in design to fit the road?
(3) How should the design of the road and paving be modified to meet changing conditions of subgrade, climate, etc.? How shall sub-soils be improved?
(4) What sum of money is the locating engineer justified in spending to avoid increase in distance, curvature, rise and fall, maximum grade, maximum curve?
(5) What system of maintenance and organization is best fitted for types of roads, differing in traffic, in materials, and in climate?
(6) What is capacity of a road of given width for type of vehicle as expressed in vehicles per hour, ton-miles per year, etc.? What is the appropriate unit for expressing traffic for various purposes?
(7) (In construction many questions arise in selection, production and economical use of materials, standardization and regulation.)
(8) How can the volumetric changes in roads be overcome?
(9) What is the economical life of various types of roads—that is, when maintenance charges exceed earning value?

Administration

(1) What should be the policy in control of truck and bus transportation systems, terminals, routing, etc.?
(2) What police regulations should control use of roads?
(3) What is the best administrative and executive organization for administration and operation of roads?
(4) What principles should govern the selection of a system of roads in its various parts, as influenced by inter-state, intra-state, county, local traffic, etc.?

Financing

(1) What should be method of financing construction and maintenance of roads? What portions of cost from long term bonds, and what from current funds? What form of bonds should be issued and how create a market for them?
(2) What should be the relation between life of bonds and economical life of road?
(3) To what extent do social betterment, military use, i.e., social value, and other imponderables enter into highway policy?
(4) What should be the distribution of costs as between Federal, State, county, township, property benefited, the user and other units?
(5) How shall the future maintenance charges on completed road systems be met? Shall the user pay all of these?
(6) How shall safety be ensured on the roads?

Answers to these questions cannot be made without data that are at present unavailable.

Research is necessary, and a mobilization of the efforts, of research agencies in a comprehensive program. The Highway Research Committee of the Division of Engineering of the National Research Council has undertaken the coordination of such research. The National Research Council will not engage in research directly.

The chart reproduced herewith is devised to indicate the field of research as divided into subfields in which research should be developed, and from which data should come to enable answers to be made to these questions among others.

Some of the studies that should be made are as follows:

(1) To develop a traffic census blank. Here a traffic classification must be made, the purpose of the census determined, and the various forms and instructions standardized.
(2) *In order to determine the cost of transport* a statistical table must be made that notes all of the elements of cost; sometimes only a few of these are reported.
(3) To study the operating costs of elements entering into location of highways, such as distance, grade, curvature.
(4) To study loads on roads as produced by the vehicle.
(5) To study design of vehicles with a view to lessening their effects on the road.
(6) To study supporting power and improvement of subgrades and the relations to design of paving.
(7) To study resistance of concrete slabs to alternate stresses and to surface loads.
(8) To study proportioning and use of bituminous materials.
(9) To study bonding of brick surfaces.
(10) To study volume changes and the means of meeting them.
(11) To study operations of concrete mixers.
(12) To study the organization and economics of construction plants.
(13) To study sand-clay, top-soil and gravel roads.
(14) To study cellular and other new types of paving.

There is apparently a widespread activity in highway research throughout the United States on the part of the Bureau of Roads, the U. S. Army, the State Highway Commissions, the universities and of industrial organizations and an earnest desire to put highway construction on a scientific basis.

The economical features are under critical examination by such organizations as the National Chamber of Commerce.

We should be able to express quantitatively the results of a standardized economic survey of a road project, just as in the case of a water-power project for instance, except for those imponderables, which, like social betterment and public policy, influence the conclusions so profoundly.

It is not too much to say that the situation is critical and that the sooner those interested come to a basis of fact the more assurance we will have that the public will not interrupt progress in providing for highway transport because of a general feeling of insecurity.

TENTATIVE CHART
TO SHOW ORIGIN OF FLOW OF DATA FROM

THE FIELD OF HIGHWAY RESEARCH

IMPORTANT ELEMENTS DEMANDING STUDY ARISING IN THE DIVISIONS OF I TO V
(STRUCTURES OMITTED) (ELEMENTS ARE OFTEN INTER-RELATED)
STATIC CHART.-COMMITTEES ORGANIZED TO OCCUPY FIELD

I ECONOMICS (DATA FOR ECONOMIC SURVEY AND STUDY OF PROJECT)	II OPERATION	III DESIGN (ROAD)	IV DESIGN (VEHICLES) AS RELATED TO ROAD	V CONSTRUCTION
1. TRAFFIC STUDIES (REGIONAL) A. DISTRIBUTION IN REGION B. CHARACTER (TRAFFIC BLANK) VEHICLE WEIGHT AND DISTRIBUTION SPEED TIRE (CONDITION) COMMODITY LENGTH HAUL C. METHOD OF EXPRESSING UNIT OF TRAFFIC D. PREDICTED CHANGES E. OTHER TRAFFIC ON STEAM AND ELECTRIC ROADS F. CENTRAL SOURCES OF TRAFFIC 2. COMMUNITY NEEDS SYSTEMS OF ROADS IN CLASSES FOR INDUSTRIES, ETC. INTANGIBLES 3. COST OF TRANSPORT CAPITAL COST ROAD VEHICLE FIXED CHARGES OVERHEAD OPERATION MAINTENANCE ROUTINE REPLACEMENT ON ROAD ON VEHICLE EQUIVALENT UNITS X-AUTO = Y-TON TRUCK, ETC. ECONOMIC LIFE 4. ECONOMICS OF LOCATION COST OF DISTANCE RISE AND FALL CURVATURE RULING GRADE RULING CURVE 5. FINANCING BONDS TAXES FEES ETC. 6. HIGHWAY VALUATION INCREMENT OF LAND VALUES	1. CONTROL OF TRAFFIC ROUTING TERMINALS FRANCHISES POLICE REGULATIONS 2. ACCIDENT INSURANCE 3. PLANNING SYSTEMS OF TRANSPORT FINANCING ENVIRONMENT RELATION TO OTHER TRANSPORT ORGANIZATION 4. FINANCING (SEE I) BONDS, TAXES, FEES 5. DISTRIBUTION OF COSTS TRAFFIC PROPERTY POLITICAL UNITS 6. MAINTENANCE SYSTEMS 7. MAINTENANCE MACHINERY 8. MAINTENANCE METHODS ROUTINE REPLACEMENT SNOW REMOVAL, ETC. 9. TRAIL MARKING 10. COST ACCOUNTING 11. SAFETY	1. SUBSOIL STUDIES PROPERTIES PHYSICAL MECHANICAL CHEMICAL DRAINAGE SUPPORTING POWER IMPROVEMENT BY TREATMENT EFFECT OF ROAD DEFORMATIONS EFFECT OF CLIMATE DISTRIBUTION OF PRESSURE 2. BASE COURSE CHARACTER, TYPE THICKNESS MATERIALS CROSS SECTION 3. SURFACE CHARACTER THICKNESS MATERIALS CROSS SECTION WEAR BY TRAFFIC WEAR BY ELEMENTS IMPACT OF TRAFFIC TRACTIVE RESISTANCE WEAR OF TIRE WEAR OF VEHICLE DUSTING INFLUENCE OF LOCALITY 4. CROSS SECTION WIDTH CROWN SHOULDERS DITCHES 5. LOADS STATIC IMPACT SURFACE INTEGRAL AS EFFECTED BY DESIGN OF VEHICLE 6. DESIGN OF INTEGRAL SLAB STRENGTH AND STIFFNESS OF SOLID PRECAST CELLULAR 7. VOLUME CHANGES JOINTS SHOVING 8. REINFORCING THEORY OF AMOUNT KIND DISTRIBUTION DIRECTION	1. DESIGN OF VEHICLE POWER GEAR RATIO BRAKING ETC. ETC. EFFECT ON LOADS SPRUNG UNSPRUNG DISTRIBUTION ECONOMY OF OPERATION AND MAINTENANCE. (SEE AUTOMOTIVE INDUSTRY) ECONOMIC LIMIT OF SIZE OF TRUCK IN VARIOUS SITUATIONS COST OF TRUCK TRANSPORT (SCHEDULE OF ELEMENTS) ECONOMIC LIMIT OF HAUL COST ACCOUNTING 3. SURFACE TRACTIVE EFFORT WEAR ON TIRES LOADS MAINTENANCE OF VEHICLE 4. ALIGNMENT CURVES (SPEED) GRADES 5. CROSS SECTION WIDTH CROWN 6. SAFETY	1. MATERIALS BITUMINOUS NON BITUMINOUS FUNDAMENTAL MECHANICAL PROPERTIES METHODS OF TEST STANDARD TESTS SPECIFICATION PREPARATION AND TREATMENT (SEE SPECIAL LIST) PROPORTIONING 2. MIXING EFFICIENCY OF MIXER CENTRAL MIXING PLANTS 3. PLACING 4. METHODS OF TESTING ROADS INSTRUMENT CORES 5. DESIGN OF EXPERIMENTAL ROADS 6. DRAINAGE (AND DRAINAGE STRUCTURES) 7. IMPACT ON BRIDGES (SEE DESIGN) 8. REINFORCING HANDLING AND PLACING 9. INSPECTION 10. PLANT DESIGN AND CONTROL 11. COST ACCOUNTING 12. CONSTRUCTION CONTRACTS

NOTE.—This list of research studies applies to all classes of roads—brick, concrete, macadam, sand-clay, gravel and bituminous. Special problems arising in special types of roads will appear in a supplementary detailed chart.

Truck and Trailer Relations

Editor, AUTOMOTIVE INDUSTRIES:

I have just read with great interest Mr. H. W. Perry's article on "The Trailer's Place in Transportation Merchandising," which appeared in the July 21 and 28 issues of AUTOMOTIVE INDUSTRIES.

Since Mr. Perry has mentioned the apparent previous antagonism of truck manufacturers toward the use of trailers, but, at the same time, has not presented the possible reasons for this attitude toward trailer use, I believe that a brief outline of some of the reasons for this position may be of value, particularly since I have, in many cases, recommended against trailer installations where they were not adaptable.

Up until about two years ago motor trucks in general were not designed for use with trailers. Where it was desired to handle such equipment it was necessary to alter the standard construction by changing the gear ratios, wheelbase, wheel diameter, etc., in order that a satisfactory unit could be secured. Since that time the demand for motor truck ability to negotiate severe road conditions and steep gradients has greatly increased, so that the standard modern motor truck is far more adaptable to use with trailers than previous designs. This increased ability, basically provided for another purpose (that of better general performance), has made most trucks now capable of satisfactorily pulling trailers—at least where road conditions are good and other operating requirements normal. However, it does not mean that trailers are always to be recommended.

Many trailer installations have been unsuccessful due to lack of understanding of the vital conditions so essential to satisfactory performance. These conditions include a knowledge of the tractive ability of the truck and the exact road surface conditions over which the installation is to be driven. In fact, the writer knows of a recent case where trailers have been abandoned and the trucks changed back to standard, due to a previous lack of knowledge of conditions involved in operating with trailers. Such a condition would not have resulted if an unbiased or comprehensive study of the conditions had been made by the trailer maker or his salesman.

It is indeed true that the trailer has its definite field of operation, just as has the motor truck, and the growing feeling of co-operation between truck manufacturers and trailer makers is as it should be. In fact, a closer co-operation will undoubtedly result in benefit to both parties.

In conclusion, I would like to mention the following points, which must be considered before recommending trailer equipment:

First: The trailer salesman must learn and admit the limitations of trailer equipment, and must thoroughly understand those installations where this equipment can be satisfactorily used. An installation which proves unsatisfactory not only reflects against the trailer maker, but the truck maker as well, and often causes dissatisfaction which requires great effort to overcome.

Second: A thorough study of operating conditions, including road, load, grades, etc., must be made before recommending trailers. This is done by the truck maker, or his salesman, before determining the type or size of truck, and applies as well to the use of trailer equipment. A thorough understanding of the engineering principles involved relative to drawbar pull and performance ability must be had. I have seen many trailers discarded due to lack of appreciation of the engineering requirements.

Third: The purchaser of the truck and trailer must be properly instructed as to their use and must understand that if the conditions of operation are altered, the ability of the installation to perform satisfactorily may change. It seems that there has been a greater desire to make a sale on the part of the truck as well as the trailer maker than should be the case, particularly since it often is evident that the proper sized units have not been installed.

Fourth: Many statements made by trailer makers are misleading, and in some cases really reflect upon the truck maker. For instance, to quote from Mr. Perry's article: "The attachment of a pintle hitch hook as standard equipment on the rear of the truck indicates that that particular make of truck has drawbar pull and that the makers are selling transportation as well as motor trucks." The converse of this statement would be that a truck which did not have a pintle hitch hook could not well be used with trailers. The ability to haul trailers, as mentioned before, is based upon definitely understood values of weight, gear ratios, etc., and whether or not a pintle hook is mounted, the performance ability is in no way changed.

I believe that a more thorough co-operation between manufacturers of both types of equipment will result in discontinuing many similar misleading statements, and that the trailer makers, and particularly their salesmen, will enter their field of operation with a full understanding of all of the principles involved. The trailer has its legitimate field, and as a result I see no reason why it should attempt to encroach upon the field where motor trucks without trailers can be used, any more than either the truck or trailer can be expected to solve all transportation problems.

E. B. NEIL,
Mechanical Engineer, Sales Engineering Division, The Pierce-Arrow Motor Car Company.

The Life of Storage Batteries

Editor, AUTOMOTIVE INDUSTRIES:

We thoroughly approve of your recent articles and editorial dealing with the policy of certain car manufacturers of installing storage batteries of inadequate capacity. Our own experience of the past eight years thoroughly corroborates your conclusions.

We have had several cars which were equipped with a certain make of battery, and in no case have we been able to obtain one year of service without expensive repairs. On the other hand, our experience with another make of battery has been extremely satisfactory. We have had cars for over three years which were equipped with the latter battery which involved no expense whatever. We know of several Cadillacs purchased in 1915 or 1916 which still carry the original battery.

Our own experience is perhaps slightly better than the average since, as chemical engineers, we realize the necessity of giving a battery appropriate care. At any rate, the failure of certain batteries on our cars has never been charged by the local branch of this maker to be due to anything but natural wear. These people have told us on several occasions that one year is the maximum which anyone should expect from a battery.

We think the car manufacturers should realize that these are times of fiercest competition, and that the public, while slow to crystallize its judgments, is firm in conclusions when reached and that a reputation for equipping with a poor storage battery may readily create serious sales resistance.

E. L. CONWELL, President,
E. L. Conwell & Co., Inc.

Performance of Air-Cooled Aircraft Engines

Editor, AUTOMOTIVE INDUSTRIES:

Colonel Vincent's assumption that I referred to the RAF-4-A 12-cylinder Vee air-cooled engine in my remarks regarding air-cooled Vee engines is incorrect.

My remarks referred to the RAF-4-D and 4-E 12-cylinder Vee engines, these being RAF-4-A engines fitted with overhead valve aluminum cylinders and having a very different performance from that of the RAF-4-A engine quoted by Colonel Vincent.

The performance of the RAF-4-D engine was as follows:

220-b.h.p. at 2000 r.p.m.
Fuel consumption .52 lbs.
Weight complete with cowling 650 lbs.
Bore—100 mm. (3.94 in.).
Stroke—140 mm. (5.51 in.)

At the time of design (1916-1917) this performance did not compare very unfavorably with the best water-cooled engines, especially when considering that the balance of the engine apart from the cylinders was practically all of pre-war design.

Colonel Vincent's opinion that the radial form was adopted for cooling reasons, if based on the performance of such engines of the RAF-4-A and similar types, would no doubt be correct, had air-cooled cylinder design remained stagnant since 1914.

When criticising the air-cooled Vee engine it is well to consider the wonderful performances put up by the early Renault engines, the latter on account of its pioneer work is really the father of modern air-cooled aircraft engine.

S. D. HERON, Power Plant Section,
McCook Field.

U. S. Leads in New Zealand Imports

DURING the first four months of 1921 the Islands of New Zealand imported a grand total of 2891 motor vehicles, made up of passenger cars and chassis, motor trucks and chassis, and electric passenger cars and electric trucks. Of this total, the U. S. A. and Canada furnished the major amount, the U. S. A. leading with a total of 1258, followed by Canada 1111, and the United Kingdom 361. France, Italy, Belgium and Australia supplied the remainder. The following tabulation shows the classification and origin:

NEW ZEALAND IMPORTS, JANUARY, FEBRUARY, MARCH, APRIL, 1921

	U. S. A.	United Kingdom	Canada	France	Italy	Belgium	Australia
Passenger cars	1,682	207	779	18	24	13	3
Passenger car chassis	27	6	13	44	13	4	..
Motor trucks	120	113	99	3	..	..	..
Motor truck chassis	29	35	220	33	..	..	..
Total	1,258	361	1,111	98	37	17	3

Ford importations come from the Canadian factory which accounts for the total of 1111 cars and chassis as compared with a total of 1258 from the U. S. A.

In the importation of motor trucks and chassis Canada leads with 319, compared with 149 from the U. S. A. and 148 from the United Kingdom. Here again unquestionably the Ford figures are largely responsible for the Canadian total.

During the 4 months there were only six electrically-driven motor vehicles imported, these all coming from the U. S. A. in the form of motor truck chassis.

Total figures on imports of cars and trucks into New Zealand during 1919 and 1920 were recently published by The Radiator, the organ of the New Zealand dealers association, known as The Motor Garage Proprietors' and Cycle Traders' Association of New Zealand, Inc. These totals are:

	1919	1920
Passenger cars	5,270	10,541
Trucks	804	1,431
Tires (pounds sterling)	860,048	1,803,959
Spares and parts (pounds sterling)	118,724	240,997

An analysis of the imports during the calendar year of 1920 shows a total of 7447 cars and trucks from the U. S. A. Canada was second with 3852 and the United Kingdom third with 615. The following tabulation shows the origin of imports:

	Passenger Cars	Passenger Chassis	Trucks	Truck Chassis	Electric Passenger Cars	Trucks, Electric	Total
U. S. A.	6,977	89	204	163	1	13	7,447
Canada	2,850	178	258	566	..	..	3,852
United Kingdom	352	21	168	68	..	6	615
France	20	4	..	..	..	..	24
Italy	11	33	1	4	..	..	49
Australia	6	..	..	..	..	..	6
Total	10,216	325	631	801	1	19	11,993

In the importation of tires the greatest volume came from U. S. A. with Australia second, France third, United Kingdom fourth, Canada fifth and Italy sixth. The following figures in pounds sterling show the volume of business for tires and tubes and also for parts for vehicles:

For First Four Months, 1921	Tires and Tubes	Parts and Materials
U. S. A.	131,143	48,079
Australia	79,484	1,764
France	51,748	435
United Kingdom	43,189	20,503
Canada	37,835	30,359
Italy	36,766	806
Belgium	437	....

When the imports of tires and parts for the calendar year of 1920 are considered the following figures show the U. S. A. to lead in tires, followed by Australia, Italy, Canada, United Kingdom and France. The figures are:

	Tires and Tubes	Parts and Materials
U. S. A.	709,591	147,751
Australia	321,382	6,872
Italy	226,963	17
Canada	220,362	46,585
United Kingdom	168,930	39,263
France	154,137	388
Belgium	1,730	120
Japan	864	1

Human Factors Largely Responsible for Waste in Metal Trades

A recent report indicates that waste in the metal trades runs to one thousand million dollars annually. Much of this is due to lack of understanding of the relation which human beings bear to efficiency of operation. The report is summarized and discussed here by Mr. Tipper.

By Harry Tipper

THE report of the Committee on Elimination of Waste in Industry appointed by the American Engineering Council has been issued in respect to the metal trades and this report has been noted by the newspapers and other general publications.

The report itself should be of interest to the automotive manufacturer, because it covers a line of industry similar to that in which he is engaged and in a large measure relates to products or material which he must buy in considerable quantities during the year. Any waste to be found in the general metal trades affects the cost of the automotive manufacturer in a number of directions. It is possible that the manufacturer of automotive apparatus might find interesting material for an analysis of his own plant from the suggestions of the report.

It is evident from this report that the causes of the waste are in a large measure human.

The waste itself is reported to run to one thousand million dollars a year in this industry. The figure is a very impressive one, but in view of the size of the metal trades industry, it is not likely to be overestimated. If all the waste could be computed, it is probable that it would reach a total much larger than the one indicated by the committee and that it would cover items not considered by the committee.

The executives in production will not be inclined to agree with the statement on paragraph four of the report:

> **"It is estimated that at present about 80 per cent of the responsibility for waste or non-production rests with the management—that is, with the managers and executives in the plant."**

There is no way of checking this percentage so that its accuracy can be determined. Except for the percentage itself, the statement is correct in essence, and until the executives and managers of industry fully understand the extent of their responsibility, a large part of the waste will continue to go on.

> **The centralized systems of industry usually operating to-day do not encourage the continual alert analysis of the operations and human possibilities, so that the value of the present methods can be determined. The precedents, rules and regulations of the present systems have become so much a part of the attitude of the younger executives that their judgment is almost limited to these and does not exercise itself outside of the rules or in questioning the systems themselves. The older executives, who received their training when industry was much younger and very different in its methods, are usually so far away from the present system in its detailed operation as to be unequipped to analyze it and to deal with its inefficiencies.**

The replies received from the manufacturers in the thirty-two plants visited indicated this lack of understanding on the part of the managing executives and the way in which the elements of the systems themselves are neglected.

These statements are quoted so that their diversity and ineffectuality may be properly noted.

> Being asked their (the managing executives) opinion as to the main cause of waste or inefficiency, their answers were as follows:
>
> In eight plants the answer referred particularly to present business conditions and was to the effect that "the most important cause is the uneven volume of business or the fluctuation in the demand for the product; lack of enough business to keep going at normal capacity."
>
> In four plants the cause given concerned the railroad situation and the functioning of the Railroad Adjustment Board.
>
> In three plants the cause given was "lack of standardization of design of products."
>
> In two plants the cause given was "labor turnover and strikes," one executive saying that these had been caused by wartime conditions.
>
> In four plants the cause given was "lack of planning"—the exact words being "lack of proper planning and routing;" one "lack of correct planning and material control;" one "unscientific planning and management;" and one "lack of efficient planning and management methods."
>
> In six plants the cause given was "lack of co-operation between management and labor."
>
> Other causes given in various plants were as follows: "Lack of intensive study of methods;" "cost control systems needed;" "daily cost reports needed;" "lack of scientific management applied to all phases of the business;" "inefficiency of labor and excessive overhead."
>
> In other plants special causes in the machine-tool business were given as follows:
>
> "The failure of machine-tool builders to supply what the public wants."
>
> "Most of the metal trades shops are very small and require personal handling by the manager of such important problems as are handled by our system of production control."
>
> Insufficient capital to develop sales and to improve facilities.
>
> Purchasing in small quantities, by the small plants which places them at a disadvantage as to favorable prices and as to transportation and handling expense.

All the causes noted in the statements of the managing executives of the plants are subsidiary causes aris-

ing out of the failure in other directions and not fundamental or primary causes in themselves.

A little thought will show that these causes are due—all of them—to a lack of analysis, particularly the absence of the analysis of the human side and the relation which labor bears to the efficiency of the operation.

This is the case not only with the labor in the shop, but with the supervisors and departmental executives who require a greater degree of understanding and who should be chosen with greater analytical care.

Lack of standardization, labor turnover, lack of proper planning, lack of intensive study, excessive overhead, failure to supply what the market requires, insufficient capital, and so forth, are all questions of management.

It is the distinct and definite responsibility of management to see that proper systems are adopted and that these systems are economical and not wasteful. It is the responsibility of management to see that there is cooperation between the supervisor and the worker. There is no escape in any of the cases from the responsibility imposed upon the manager to know what systems, what measures and what studies are required in his own shop, for his own purposes and to see that these are planned and adopted.

There is no escape from the responsibility placed upon the manager to understand those who work in the shop, to study them so that he will thoroughly understand them, to work with them, and to see that the matter is so arranged that there is an incentive for the worker to put forth his full power. Neither is there any escape from the responsibility resting upon the management to see that each man is given the amount of responsibility in harmony with his operations and that the system is sufficiently flexible to encourage him to exercise his judgment in meeting this responsibility.

Of course, this responsibility of the management is only beginning to be recognized. A few years ago the only responsibility understood or accepted by management was the responsibility of making a profit. The responsibility of making a profit does not lead to an intensive analysis of the probable wastes, unless those wastes interfere with the profit itself. In an era of extensive business such as we have passed through, the prices which can be secured for the products will permit the profit, even with a large amount of waste entering into the costs of their production.

The whole of the many pages of this report can be summarized in the statement that the wastes are wastes of human capacity and energy, of human analysis and understanding arising out of the ignorance of human reactions and the elements governing human efficiency.

No better illustration could be offered of the necessity for the study of humanity in industry than the statement of a billion dollar waste, of which at least eight hundred millions are admitted to be the waste of human ignorance in regard to human necessities.

Without regard to the accuracy of the report in many respects, the report itself should give plenty of food for thought to the average manufacturer.

In the near future the manufacturer will be required to produce with much less waste in order to meet the competitive conditions and still retain the profit he has been accustomed to make. This reduction in the cost of production cannot be met merely by changing the rates of wages, it must be met very largely by increasing the efficiency of production.

Truck Wheel Standardization in Germany

IN Der Motorwagen the suggestion to standardize cast steel motor truck wheels is made by Engineer Kienzle, who is evidently a member of the Standards Committee of the German Association of Automobile Manufacturers. Outside diameters and widths of tires, as well as inside diameters of rims, have been standardized already. It is estimated that complete standardization would result in a reduction of 50 per cent in the cost of production. Two general designs of front wheel hub are illustrated, both adapted to the use of either ball bearings or floating bushes. In the first the hub has a smooth bore and receives a sleeve, whether plain or ball bearings are used. In the second the outer races of the ball bearings are mounted directly in the hub, and as the outboard bearing is of much smaller diameter than the inner bearing, the wheel hub must be bored out to two different diameters. The elimination of the sleeve, of course, saves the cost of its manufacture, but it is difficult to turn ball bearing seats directly in the wheel (which is handled in a vertical turret lathe) with the accuracy required for the purpose. The sleeve would be bored in a precision lathe in which the required degree of accuracy is easily attained. Another advantage of the sleeve construction is that when wheels are interchanged the ball bearings need not be disturbed, and as the replacement usually takes place outside the factory, it is believed that this would obviate much trouble, as incorrect replacement of the ball bearings or the admission of grit would lead to their rapid destruction.

If plain bearings are used the cost of construction of the two designs would be about the same, as the slight extra cost of the sleeve with two diameters would be balanced by the reduction of materials cost for the whole wheel and the saving on the smaller hub cap thread.

It is also stated in the article that steel foundries figure that wheels with cruciform spokes can be manufactured at about 75 per cent of the cost of wheels with hollow spokes, partly owing to reduced wastage, which in the case of hollow-spoked wheels is mainly due to incorrect placing of the cores. The core work in itself is quite an item of expense.

The Aircraft Year Book

THE third edition of the Aircraft Year Book is being distributed. This volume continues the same effort put forth in the previous Aircraft Year Books—a presentation of the air transportation development of the previous year. These volumes are a commendable effort in preserving a continuous history of the development of this new phase of transportation. The present volume is technical in only a slight degree, but chiefly presents a story of practical development. The text includes a list of the commercial companies operating in 1920, with a report of operation mileage, which report has been printed in AUTOMOTIVE INDUSTRIES. Chapters are devoted to the operation of the Air Mail Service, Aerial Forest Patrol, the Marine Uses of Aircraft, Aerial Photography, News Gathering, the Need for Federal Control, Air Ports, Military Uses and similar live topics. The appendix gives many facts concerning the industry. In the technical section the design of present aircraft is traced from the Wright Bros. machine in a series of drawings. The volume is published by Small, Maynard & Co.

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The AUTOMOBILE
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Petroleum, Iron and Coal

HOW important a factor petroleum has become in the world's commerce during the past several years is well brought out by some statistics contained in a paper on The Effect of the War on Mineral Supplies, presented at a recent meeting of the (British) Institution of Civil Engineers. It is shown that whereas most lines of mineral production fell off heavily in the course of the war, the production of petroleum increased more than 75 per cent. The output of coal dropped from 1,320,000,000 tons in 1913 to 1,130,000,000 tons in 1919, and the output of iron ore from 175,000,000 tons in 1913 to 145,000,000 tons in 1917, but the output of petroleum increased from 55,000,000 tons in 1913 to 98,000,000 tons in 1920.

The decrease in the production of coal and iron ore was certainly not due to any lack in demand for these products; the enormous increase in the price of coal, particularly in European countries, indicates a very heavy demand, and the sole reason for the drop in production was the lack of sufficient labor. Petroleum producers had to meet this same difficulty of scarcity of labor, but they found the labor necessary to nearly double their output, while other industries devoted to prime necessities fell back. The conclusion to be drawn is that during the world war petroleum was a more important factor than either coal or iron; or, more precisely, that an increase in the output of petroleum was more urgent than an increase in the production of the other two basic materials.

"New and Useful"

THE patent law of the United States provides that, in order that a patent may be secured on an application, the device on which the application is based must be new and useful. Undoubtedly the patent laws of other countries make similar requirements, though the efforts made to look up records and determine novelty vary to a considerable extent. Up to not so very long ago the United States and Germany were the only countries whose patent departments made a search for possible anticipations. The search in any case is limited, and the Government does not guarantee the validity of the patent which it grants; if it is contested it remains for the courts to decide the matter.

Recently there has been some discussion in England as to the extent of the search made by the British patent office to determine the novelty of applications, and it has been brought out that this is limited to the British patent records for fifty years back. That under these circumstances many applications are allowed that would seem unpatentable is obvious. We were reminded of this discussion on seeing in a British engineering paper an abstract of a patent recently granted to the Daimler Motor Co. and A. E. Berriman on Improvements in Electric Lighting Systems for Motor Vehicles. A switch in the lighting circuit connects a resistance in one of the battery leads for the purpose of dimming the lights momentarily, thereby avoiding danger and discomfort to the drivers of oncoming vehicles.

We had thought that the use of a resistance in series for the purpose of dimming lights was known to everybody having to do with electrical work, as it is common practice in the electric lighting of motor vehicles in this country. It is easily believable that no patent was issued on the system in Great Britain during the fifty years preceding this application. Every electrician is familiar with the effect of including a resistance coil in a constant potential lighting circuit, and the thing is so obvious that hardly anyone would have the temerity of applying for a patent on it.

Concerning Detonation

IT seems to be agreed that detonation with its accompanying knock which occurs during the combustion of fuel in an engine cylinder is a factor of prime importance in relation to the value of internal combustion engine fuels. The cause of detonation is thought by some to be due to an extremely rapid combustion or liberation of energy. In any case the

accompanying pressure rise is known to be very great and exceedingly rapid. The results are certainly injurious to the engine and are most unpleasant so far as the engine operator is concerned.

There appears to be but little doubt that if the effects of detonation could be avoided, higher compression or expansion ratios could be employed and higher thermal efficiencies obtained. This fact alone is sufficient reason for strenuous efforts to overcome or control detonation, but there is considerable doubt as to how this can be accomplished. The use of certain diluents or dopes in the fuel appear to be promising, but it remains to be seen how generally they will be employed, and many question whether they will after all prove to be an answer to the problem. It is well, however, that their utility is being investigated, for the fuel problem is so important that it is well to prosecute every possible line of attack upon it which appears at all promising.

One so-called fuel "dope" tried recently at the Bureau of Standards was found to overcome the knock when used in a fairly large proportion, about 10 per cent, but the maximum power output of the engine was also reduced. Precisely the same result was attained, however, by making provision whereby the spark could be retarded further than is possible with most retard mechanisms. Dopes are supposed to slow down the rate of burning of the fuel and a late spark is thought to accomplish the same result. This raises the question as to whether the relation of spark advance to the detonation phenomena has been adequately considered and investigated. There is, of course, no point in using doped fuel if the same effect upon performance can be obtained by simply changing the ignition timing. Our present knowledge is too limited to draw any general conclusions in this regard, but it is a matter worthy of further careful research work.

Confidence Cuts Expenses

THE chief executive of a large unit parts firm said the other day: "If our customers would so far take us into their confidence as to tell us with some degree of frankness what are their plans for the next three months, we would be able to save thousands of dollars in production expense—and a fair share of the saving would accrue to the automobile factories in the long run." The loss incident to the cancelation of a contract to purchase parts must of necessity be added in the end to the purchase price. Hence the purchaser ultimately stands the loss.

While it is doubtless true that many manufacturers are somewhat hazy as regards their plans for the next three months, every firm has, or should have, more or less accurate ideas as to the immediate future. From every part of the various industries contributing to the automobile industry has come the complaint that the parts maker is not sufficiently taken into the confidence of the manufacturer as regards future plans. It is not possible in every case, of course, to consult freely with supply sources, yet it is probable that a greater measure of co-operation would greatly benefit both parties.

Modern industrial organization is composed of units so closely inter-dependent that only through sincere co-operation and a recognition of a moral as well as a legal obligation in doing business can permanent progress be made. The conviction is growing that to give more is to get more. That this is a practical business doctrine is being evidenced more frequently in all industrial relationships, between employer and employee, between manufacturer and consumer, and between manufacturer and manufacturer.

Nomenclature for Isolated Electric Plants

THERE has been considerable discussion concerning the best nomenclature for the electric units formerly called farm lights. Such lights are now being used extensively in motion picture theaters, business plants, and other establishments, however, so that there appears to be a need for a more inclusive name.

Some time ago AUTOMOTIVE INDUSTRIES dropped the name farm light plants. It has used instead the term "isolated electric plant." Believing that it would be highly desirable for the industry represented in the manufacture of these units to agree as nearly as possible on a proper designation of these plants, AUTOMOTIVE INDUSTRIES recently sent a questionnaire on the subject to the chief manufacturers. The questionnaire asked these questions:

1. What is your idea of the proper designation?
2. In your opinion, whose task should it be to establish a nomenclature for this rapidly developing industry?

The replies received to these queries indicate that there is a rather general agreement on the isolated electric plant terminology. Several manufacturers, while they do not use this term exclusively at present, believe it to be the best available. The National Gas Engine and Farm Power Association is frequently mentioned as the organization whose task it should be to establish the nomenclature for this industry. One maker suggested the Society of Automotive Engineers in this connection.

Only one reply definitely opposed the term isolated electric plant, on the ground that the term isolated does not have a pleasing sound to the prospective purchaser. This company writes, "In our advertising we have featured these plants as electric light and power plants, leaving out the word farm entirely. It is possible that some better designation than has yet been suggested can be thought of."

There were numerous suggestions that the business papers should be active in attempting to establish a standard nomenclature. It is evident from the replies that considerable discussion along this line has already occurred in the Gas Engine and Farm Power Association. One reply states that "each time the matter is brought up in a meeting of the manufacturers of these plants there are as many suggestions as to the proper designation as there are members present."

A survey of all the replies, however, indicate a very general agreement as to the advisability of using the term isolated electric plant.

Industry Suffering from Short Credit, Avers W. C. Durant

Thinks Much of Present Distress Due to Extortionate Interest —Flays Bankers

NEW YORK, Aug. 9—Recovery of the automotive industry, which is suffering from the same causes as all other industries, will be surprisingly rapid and will take the lead in industrial activity, is the opinion of W. C. Durant. The automotive industry is, and will continue to be, an essential factor in the development of civilization, he contends. It has gone through its period of reconstruction, has organized its methods to meet the new order of things and is better prepared to-day for a running start than almost any other branch of industry.

The solution of the gravest of the problems which confront the business men of the country rests upon adequate credit, Durant asserts. In this connection he says:

"When cheaper money is available for business men who need it, when credit is extended in generous measure to business men who are entitled to it, when Government securities have been put on a 100% basis, we will hear less about 'frozen credits,' courage will be restored and the usual American action, which we all so much admire, in place of indifference and apathy, will be in evidence and we will quickly get back to normalcy."

The views of Durant, long a real captain of industry, are contained in a statement prepared by him for the current issue of Commerce and Finance. In this statement he arraigns mercilessly the attitude of big bankers and charges them with exploiting the needs of legitimate business for selfish purposes. In this connection he says:

"I contend that much of our present distress is due to extortionate interest rates and restricted credits. In this financial crisis the bankers have not met the situation and are largely responsible for the chaotic condition now existing.

"Never in the history of this country was there greater need for low interest rates and more elastic credits.

"Instead of helping to relieve the situation and restore order, the bankers and those in control of the money supply and credits have been taking advantage of a situation. For months, call money rates have been outrageously high, with time money almost impossible at any rate—and this condition existing with our natural and accumulated wealth, with nearly one-half the gold of the world in our possession and with a great Federal Reserve Bank created for the purpose of doing a real service to commerce and industry in an emergency.

"If money and credit are available only for certain preferred purposes and at certain rates, business is bound to suffer. The Sherman Law and Clayton Act are intended to prevent monopoly and control, but no good plan has yet been worked out which gives to a perfectly solvent concern the ability to obtain a line of credit to which it is entitled at terms that are just and legal.

"At a time when business in every industry and commercial line is suffering and business men in all lines are carrying tremendous burdens, the bankers are exacting the highest rates ever known and forcing liquidation beyond all reason. Word went forth some time ago: 'Liquidate and pay.' And liquidation has been going on at a fearful rate and at a terrific sacrifice.

"The Federal Reserve Bank was created for the purpose of meeting emergencies. How did it meet this present emergency? By establishing unattractive and prohibitive rates, making last year the enormous profit of 200%. By advocating and encouraging liquidation in the face of a business and industrial crisis such as this country has never before known. Result—business paralysis, with industry, the life of our country, so weakened and enfeebled as to make recovery slow and painful.

"I recall recently having heard of many of our well established and well managed concerns in industrial pursuits reducing or passing dividends, but I have yet to hear of a single well established or well managed bank reducing or passing dividends or showing any falling off of earnings.

"And what have you to suggest? you ask. My answer: Give the business men of this country 1% call money? Let the Federal Reserve Bank establish a discount rate of 3%. Let our banks stop forcing liquidation. Let our banks extend rather than curtail credit.

"Let the big bankers of this country, who control the money situation, do the right, fair, honest, decent, unselfish thing just this once, and for their own good and safety and the benefit and safety of this country and our people, do it now."

A. A. A. Will Seek Cheaper Insurance for Members

WASHINGTON, Aug. 9—The executive board of the American Automobile Association has decided to widen the scope of the association's activities. One of the subjects which will be taken up is that of automobile insurance. The question has been placed in the hands of a committee which has formulated plans for cheaper insurance for A.A.A. members. Retention of counsel familiar with automobile law to provide free legal advice to members will be given immediate consideration.

A new method of protecting members' cars from automobile thieves is being evolved and will be tried out in the near future in Washington.

The A.A.A. will renew at once its efforts to obtain the passage of a national reciprocity law which would mean that motorists could travel anywhere in the United States for unlimited periods with their home state license tag.

Durant Motors Takes Over Sheridan Plant

Production of New "Durant Six" Will Start in Month or More at Muncie

NEW YORK, Aug. 9—The plant of the Sheridan Motor Car Co. at Muncie, Ind., was taken over on Aug. 1 by the Durant Motors Co. of Indiana, a $3,000,000 corporation of which D. A. Burke is president and general manager. Only the plant itself was purchased and the new owners did not acquire the inventory which had been assembled by the General Motors Corp. for the Sheridan car.

Production of the Sheridan, which will be rechristened the Durant Six, will not begin for a month or more under the new ownership. The models are being redesigned and rebuilt at the Long Island City plant. They will retain practically nothing of the old Sheridan. The Durant engine will be used and all the principles of design embodied in the Durant Four will be included in the Six. One of the main features will be the accessibility of the various parts and another will be the strength of the chassis.

The general body lines designed by Burke will be retained except that the hood will be lengthened eight inches. When Burke designed the Sheridan he worked out ideas he long had cherished of building a luxurious car which would sell at a moderate price with many of the refinements found in those of the higher price classes. He sold this idea to Durant and the result was the establishment of the Sheridan division of General Motors. This idea will be retained by the new company but the car which will be turned out will be much more powerful than the one which was built up to Aug. 1.

The prices of the various models of the Durant Six will be: Roadster, $1600; touring car, $1650; coupe, $2250, and the sedan, $2400.

The sedan model of the Durant four now is ready for production and will sell at $1365. The coupe will sell at the same price but a few changes are to be made in the body lines.

Severin to Move Plant; to Employ 500 Workers

OAKLAND, CAL., Aug. 10—The Severin Motor Co. of Kansas City will move its factory from that place to Oakland, according to J. R. Elrod, local representative of the company, with offices in the Henshaw Building here. The decision to locate here was made after H. T. Severin, president of the company, had inspected sites in several Pacific Coast cities, Elrod said. The new plant will cover four acres, and the first unit, 60 x 450 feet in size will be started immediately, according to the local representative, who placed the cost of the first building at $300,000, but admitted that the land for the plant had not yet been purchased.

Capitalists to Get Engineers' Report Favoring Dirigibles

Benedict Crowell Will Sign Recommendation for New York-Chicago Air Line

WASHINGTON, Aug. 9—Marked progress has been made in the development of dirigible transportation in this country. On Friday of this week a report favoring the establishment of air lines between New York and Chicago, and utimately between New York and San Francisco, will be submitted to a powerful group of financiers assembled in New York. The recommendations will bear the signature of Benedict Crowell, formerly Assistant Secretary of War, and Edward Shiladar, a noted consulting engineer who assisted General Goethals in building the Panama Canal. After nearly two years of intensive study in Holland, Germany, France, England and Italy, these engineers are convinced that aerial transportation by dirigibles is the safest, fastest, most profitable and economical method of travel at present, and, in addition, has infinite possibilities for development.

It is believed that when the bankers are told that the investigation discloses commercial advantages, they will decide that the plan should be put into effect immediately. It also is expected to give impetus to research by American engineers in this field of industrial activity and ultimately result in the establishment of factories in this country for the construction of dirigibles.

There are no plants of this kind in America to-day and American bankers are desirous that the country should be independent of foreign manufactures. Plans have practically been completed for undertaking this gigantic enterprise with a capitalization of $50,000,000. Powerful industrial and financial groups are co-operating in this work. A heavy investment will be required if the aerial line is operated without governmental assistance.

Propose "Blimp" Hangars

Proposals have been made to use navy "blimp" hangars on Long Island, St. Louis and elsewhere, but the engineers feel that it would be best to construct private terminals. It is estimated that these terminals would cost approximately $6,000,000 each, while the first set of dirigibles would cost about $2,000,000 each.

Negotiations have been conducted with the Schutte-Lanz Co. in Holland and with German and Italian construction firms, but the deal has not been closed. Crowell and Shiladar devoted particular attention to the patents and the engineering features. It may be possible to bring engineers from Holland and Germany to this country to build up an industry here but this is not the controlling feature in the arrangements.

According to the engineers' estimates, it will be possible to use three ships about the same size or slightly larger than the R-34 which flew from England to this country. The tentative plans call for a carrying capacity of 100 passengers to cover the flying distance from New York to Chicago in ten to twelve hours, with a possible guaranteed 12-hour trip.

The Dutch and German ships are luxuriously equipped but the plans of the engineers call for the elimination of many non-essentials in upholstery and furnishings in order that the weight may be lessened and the cost of the craft reduced. A study of trans-continental, trans-Atlantic and trans-Pacific aerial routes shows that Chicago would be the logical aerial center of the world.

Further details regarding the mechanical features of the dirigibles will undoubtedly be given to the public at an early date, when the financial arrangements are actually completed. Officials of the investigating body stated that sentiment among the financial interests favors the establishment of this form of transportation and that many manufacturers of heavier-than-air machines had manifested a friendly interest.

File Bankruptcy Suit Against Shuler Axle

LOUISVILLE, KY., Aug. 8—Alleging that certain creditors of the Shuler Axle Mfg. Co. have been preferred over them, other creditors have filed an involuntary petition in bankruptcy against the company in United States District Court. It is alleged that the company has liabilities of $385,000 with assets of $250,000.

The Shuler Axle Mfg. Co. is a Michigan corporation and was organized in Detroit about four years ago. It manufactures front axles for automobiles.

According to the officers of the company it was forced into bankruptcy because its assets were tied up in securities and materials which could not be liquidated. The officers of the company are: J. J. Kean, president; R. P. Noud, vice-president, and F. A. Shuler, secretary-treasurer.

Ford Sales Show Gains in South and Mid-West

DETROIT, Aug. 10—While Ford business in all parts of the country is continuing at record heights, the company is particularly elated with improvement in the South and Mid-West, where for a long time things were at a standstill.

In an analysis of the changed situation in the South the company expresses the belief that the elimination of the one-crop plan in favor of diversified crops is responsible for the new order of things. Prosperity will be no longer dependent upon the market price for cotton or sugar or rice, Southern dealers assert to officials, but will be a permanent and welcome guest in the land.

Creditors Ask Sale of Standard Parts

Ask Federal Judge for Order—Figures Receiver Submits Questioned

CLEVELAND, Aug. 9—Creditors of the Standard Parts Co. met here to-day and voted to ask Federal Judge D. C. Westenhaver to grant an order for the immediate sale of the property of the $20,000,000 corporation which is engaged in making automobile accessories and parts. Judge Westenhaver appointed receivers for the corporation last September upon application of the stockholders.

An all day discussion preceded the action of the creditors and at times the debate grew stormy. P. A. Connelly, secretary of the company, testified that when the Standard Parts Co. was formed the capital of the corporations entering the combine was written up to the extent of $5,156,000. Since the merger was formed, he said, it had lost $8,094,000. He also attacked the inventory filed with the court, the figures in which were prepared by expert accountants.

Connelly said that the inventory should be reduced and he contended that the assets were in reality but $1,000,000 in excess of debts. Attorney A. V. Cannon, who represents the receiver, Frank Scott, asserted that the inventory was correct and that the assets of the company amounted to approximately $18,000,000. He said that after paying all debts the preferred stockholders would have left 100 per cent equity in the company.

The creditors have a plan for the sale of the property under which they would bid in the plant, form a new company and offer stock in it to the stockholders of the present corporation. Those not purchasing would lose all they had invested. The creditors would have control of the new corporation.

Judge Westenhaver took under advisement the appeal of the creditors and he did not give his opinion on the petition of the receiver for an order to pay creditors a dividend of 10 per cent on their claims.

Court Action Put Off

Action likewise was postponed by the court of the request of the stockholders that the receiver be continued for the present. Clevelanders who have been following the corporation's affairs see a hard fight being made for control by a certain group. A majority of the stockholders profess to be satisfied with the showing of the receivers who have been making money for them in the last few months. They hold that if the corporation is dissolved and the plants are sold they stand to lose. They are fighting hard to convince the court that if the present management continues, with good fall business ahead, the company will be strengthened very materially financially.

7266 Workers Added to Payrolls in July

U. S. Survey Shows 4.2 Increase in Employment in Automotive Industry

WASHINGTON, Aug. 10—Slight increase in employment in July has been reported for the automobile industry, after a survey by the special agents of the United States Employment Service. Under the classification of "Vehicles for Land Transportation," the industry is reported to have added 7266 to the payroll, representing an increase of 4.2 per cent.

Much Part Time Work

In Michigan the official agents found that part-time employment was prevalent, but strenuous efforts were being made to stimulate business by increased advertising, additions to the sales forces, more attention to efficiency of operation, and by reducing costs and labor turnover. In Flint it is reported that the automobile plants are active, although not working on full time. A gradual return to normalcy is expected in other automobile centers through the district. However, the analysis of returns would seem to indicate that in the majority of instances where there has been improvement in the employment situation it is primarily traceable directly or indirectly to the harvest and other seasonal agricultural activities. Secondarily, and to some extent as a natural corollary, there have been material gains in railroad occupations, principally in those which have to do with repairs to rolling stock and roadbeds.

Despite an obscured outlook there is manifest a very general optimism which everywhere agrees as to the certainty of an approaching business revival and varies only in the predicted time it is destined to arrive.

Widespread unemployment and part-time continues in practically all lines, particularly in the metal and building trades and transportation circles. While certain textiles show a marked improvement, frequently reaching normal and even exceeding it, and orders for shoes are being taken, the general employment situation throughout the district has not improved.

Net Sales of Franklin $14,393,858 in 6 Months

SYRACUSE, Aug. 6—H. H. Franklin Manufacturing Co. in its mid-year statement to stockholders dated June 30 reports net sales for the first six months of 1921 of $14,393,858 with a net profit of $735,826. The net income for that period was $786,561. Sales for the six months equalled 82 per cent of sales for the same period of 1920 and June sales of 1046 cars were the largest for that month in the history of the company.

Cash on hand June 30 was $850,386, compared with $1,748,294 on Dec. 31. Sight drafts and Government bonds were $293,853 as compared with $986,558, accounts and notes receivable had increased to $715,154 from $591,202. The merchandise inventory had been cut down to $5,990,701 from $7,614,695. Total current assets were $7,850,096 as compared with $10,940,752 six months earlier.

There was a very large reduction in current liabilities for the first half of this year, the total being $2,528,360 as compared with $7,368,180 on Dec. 31. Bank loans of $4,510,000 were wiped out completely. Current accounts payable and miscellaneous liabilities were $2,528,360 as compared with $2,858,180. The company reserved $2,209,421 for depreciation of fixed assets.

Milwaukee Factories Still Taking on Men

MILWAUKEE, WIS., Aug. 10—While manufacturers of motor cars and trucks, motors, frames and other parts are still adding men to payrolls, the rate of increase reached during the early part of July is not generally being exceeded, since operations now are commensurate with current demand and expectations of the call from distributers and dealers for the remainder of the summer. It is believed unlikely that any considerable enlargement of production will be necessary until the fall demand becomes apparent, for manufacturers are not inclined to make up cars for stock and keep output closely related to current orders.

The most hopeful sign of the week is the reopening of railroad locomotive and car shops in Wisconsin and elsewhere, giving employment to a great many men who have been out of work since February or March, or who have been employed half-time or less by the rotation system. As a class, railroad men were an important factor in the sale of passenger cars during the period of high wages and general employment, and it is regarded as being favorable to car sales in the coming months that conditions should take a decided change for the better in their situation. The main plant of Nash Motors Co. at Kenosha has virtually reached the 3000 mark in number of employees at work on full time. The Milwaukee plant is back at normal capacity of 1000 men. The Waukesha Motor Co. at Waukesha, Wis., is adding 200 men, giving a total of 400.

HAYNES TRACTOR DENIAL

INDIANAPOLIS, Aug. 10—Officials of the newly organized Haynes Tractor Co. and allied interests denied the rumor that they were contemplating taking over the Mid West Engine Co. of this city in a statement. Both Elwood Haynes and A. G. Seiberling declared the report was untrue. The new Haynes company took over the Tractor Co. of Indianapolis, and the Powell Tractor Co. of Elwood, and was incorporated at Indianapolis a couple of days ago.

Many Tire Plants Offered Seiberling

Former Goodyear Head May Operate Chain of Factories—Plans Developing

AKRON, Aug. 10—Although Frank Seiberling, founder and former president of the Goodyear Tire & Rubber Co., has issued through his secretary, R. C. Ellsworth, a formal denial of his rumored acquisition of the Republic Rubber Co. plant at Youngstown, his recent conferences with trustees of the Republic company and his inspection of other small rubber plants have given rise to the firm belief that Seiberling plans to stage his "comeback" in the tire industry by establishing and operating a chain of small tire plants scattered throughout the country.

Heads Many Companies

Seiberling virtually is in control of the Lehigh Rubber Co. of New Castle, Pa., which he purchased some time ago at receiver's sale. He is one of the controlling heads of the Star Rubber Co. of Akron. His secretary, R. C. Ellsworth, is heavily interested in the Marion Rubber Co. of Marion, Ohio, while W. E. Palmer, former Goodyear treasurer, now is trustee of the Marion company. Bargain offers for sale of the Republic plant at Youngstown are known to have been made to Seiberling.

In addition many small rubber plants throughout the country which now are in the throes of financial difficulty have been offered to Seiberling across the bargain counter. Seiberling is expected to make some formal announcement shortly relative to the scope of his renewed activity in the tire industry and the number of small plants which he expects to control and to operate.

In Touch with Officials

Soon after Seiberling retired from Goodyear, A. G. Partridge, former vice-president and sales manager of the Firestone company, became sales manager of the Star Rubber Co., in which Seiberling is heavily interested. This move, it is claimed, is the first step toward Partridge becoming general sales manager for the controlling company, with headquarters in Akron, which will operate the chain of small rubber companies.

Many former Goodyear officials who retired with Seiberling, and several who have since resigned from Goodyear, now are under negotiations with him, it is reported, and will be lined up for the new organization.

It is also believed that Seiberling is working on new types of tires in his New Castle plant. E. L. Davies, one of the Goodyear compounders and expert rubber chemists, has resigned and has been made development manager of the New Castle plant.

Seiberling has opened offices in the Akron business district and is in daily conference with men of the tire industry.

Bill to Ban Truck Reimports Revised

Graham Reduces Proposed Tariff Impost to 90%—Favored in House

WASHINGTON, Aug. 8—Favorable action is expected in the House on the revised Graham resolution, which has been reported by the House Committee on Ways and Means. The new measure provides for the imposition of a 90 per cent tax on all surplus war materials which have been sold abroad and reimported into this country. The bill is designed to check the flood of army motor trucks into the markets of this country.

The original bill as introduced by Congressman Graham, of Illinois, provided a 300 per cent assessment at customs, but he changed the rate to 90 per cent after consultation with members of the committee. The new bill is expected to prove as effective as the original, inasmuch as a tax of 90 per cent is sufficient to prohibit unfair competition by underselling of American motor truck dealers. The bill has a privileged status and will undoubtedly be passed this week. The committee's action is based upon the knowledge that some ad interim legislation was necessary at this time to stop the increase in reimportations of war supplies.

The Fordney bill which recently passed the House, carried a specific provision levying heavy rates on reimported material, but owing to the fact that the tariff bill will be delayed in the Senate, Congressman Graham offered the resolution. If this measure is passed by the Senate and signed by the President, it will bring to an end several months of consistent agitation in behalf of motor dealers. The original protests were filed from Los Angeles dealers' organizations where rebuilt cars were offered for sale at prices which could not be met by regular dealers.

North Carolina Raises Insurance Theft Rates

CHARLOTTE, N. C., Aug. 10—The alarming increase in automobile thefts in North Carolina has caused insurance companies to place additional restrictions upon the insurance of cars against theft and to increase the rates an average of 35 per cent. A statewide investigation into activities of reported gangs of automobile thieves has been instituted.

While no estimate is obtainable as to the number of machines stolen monthly in the Carolinas, insurance men state that the increase in thefts within the last three or four months has been alarming, and that organized gangs have gotten rich through the theft of machines and their sale in distant cities and countries. It was said that one "company," with headquarters probably in Columbia, exported stolen machines to South American countries until the men engaged in the traffic were apprehended.

Virtually all the larger insurance companies have instituted the system of making a thorough investigation of the character and standing of the applicant before insuring machines. This is due to the numerous cases where the automobile owner has destroyed his own car for the purpose of collecting the insurance. The "moral risk" is receiving careful consideration by the companies.

Cadwell Incorporates as Monarch Tractors

WATERTOWN, WIS., Aug. 8—E. D. Cadwell of New York, who recently purchased the assets of the bankrupt Monarch Tractor Co. of Watertown, Wis., for $44,000, has incorporated the Monarch Tractors, Inc., under the laws of Delaware, with a capitalization of $500,000 preferred and 5000 shares of common stock without par value. A Wisconsin charter has been granted. The application states that $100,000 is represented by the investment at Watertown.

Cadwell, W. H. Foster and James A. Bell appear as incorporators of the new Monarch company. Cadwell was a principal stockholder and one of the principal creditors of the old Monarch company and its parent concern, General Tractors, Inc., of Paulsboro, N. J., which was petitioned into bankruptcy at the same time that the Monarch company was declared insolvent. The Watertown works have been in continuous operation on a limited scale since the financial difficulties came on, and since Cadwell took over the plant production has been materially increased.

Creditors Get $17,000 from Ferris Company

CLEVELAND, Aug. 10—William A. Ferris, one of the receivers of the Ohio Motor Vehicle Co., manufacturers of the Ferris automobile and trailer, states that practically all of the preferred creditors have been paid during the six weeks the receivers have been in charge. Approximately $17,000 has been distributed to these creditors. The accounts payable now amount to $158,000, while the assets total $500,000. The receivership petition was a friendly action brought to relieve the company from suits threatened by small creditors. The application was filed by the Continental Motors Corp., which had a claim for $32,000. It was filed after consultation with the company's management. Business has increased steadily since the receivers took charge.

COAST TIRE TO EMPLOY MORE

OAKLAND, CAL., Aug. 10—The Coast Tire & Rubber Co. will increase its working staff to 500 persons Oct. 1. The company is now producing 125 tires a day, but, according to F. W. Neubach, special representative of the firm, will increase production to 750 tires.

Ford's Tractor Plan Aids Salesmanship

Sales Campaign Will Stimulate Better Business, Factory Statement Declares

DETROIT, Aug. 8—Henry Ford's plan of pushing tractor sales through all dealers of the Ford Motor Co., regardless of whether located in the heart of an industrial district or in the center of a farming community, finds defense at the factory in the statement that the plan helps to develop salesmanship among the company's dealers.

No effort is required to sell Ford cars, is the factory view. Selling of tractors, however, particularly in some eastern cities where tractors have scarcely ever been seen in operation is considered another question. Of course it will require effort to sell them, admits the factory, but dealers and salesmen are supposed to exert themselves.

There is plenty of opportunity for tractor sales outside of actual farming districts, holds the company. All sorts of pamphlets showing sales opportunities are constantly being mailed to dealers setting forth work in which tractors can be used advantageously aside from farm work. In the opinion of the company, tractors could be far more serviceable in many forms of general contracting and road construction work than horses.

It was further declared that while company experts were constantly at work developing new fields in which tractors might be used, it was part of the dealer's work to discover a few outlets for himself and put sales over. Practically every inch of the United States has been carefully analyzed, the company declares, and no tractors are being shipped where there are no sales possibilities. This holds just as good for New York City as for Jones Crossing.

Notwithstanding the contentions of the factory, there is much discontent among Ford dealers because of arbitrary shipments of tractors which the dealers do not want and which they insist they cannot sell. It is understood that in some cases where the tractors have been refused, car shipments have been withheld. In a few cases, at least, Ford agencies have been given up because of the tractor plan.

Ford Dealers Evolve Plan to Sell Tractors

NEW YORK, Aug. 9—Metropolitan distributors of Ford cars who have been compelled by the company to accept shipments of Fordson tractors in order to get the automobiles, have evolved the plan of fitting the tractors with rubber tires and other special equipment with the idea of promoting their use on docks, in warehouses and for other industrial purposes. Considerable work also has been done in adapting the machines for snow removal and other municipal work.

May Have Truck Lines for Coast Terminal

Consider Motor Transportation for Proposed San Francisco Bay Port

SAN FRANCISCO, Aug. 8—A combination of municipal and private enterprises has completed surveys, plans, engineering estimates and reports, with the approval and consent of the Federal Government, for the construction of a port terminal on the eastern shore of San Francisco Bay.

This deep water improvement, which has been incorporated as the Pacific Port Terminal, Inc., will cost several millions of dollars. It is intended to furnish adequate facilities for the handling of a large part of the foreign trade of the United States, a commerce valued in 1920 at more than $2,000,000,000 and which, it is estimated, will be doubled within the next 5 years.

One of the most prominent features of this terminal—which will have 140,000 lineal feet of berthing space, with 30 feet of water at mean low tide—is the serious consideration which has been given to equipment and facilities for the accommodation of motor truck lines throughout the terminal and on the 6000 acres of manufacturing and industrial sites on the mainland directly back of the terminal.

Five Main Highways

Five main highways, leading through Berkeley, Emeryville, Oakland and Alameda, averaging 80 feet in width, lead to the site of the terminal. Each will be continued in loop form through the industrial section on the mainland, and from this loop provision is made for paved streets equally wide to every wharf shed in the 3,000,000 square feet of wharf shed space on the filled-in bulkhead of each unit and to every warehouse on the 3,500,000 square feet of warehouse space on the filled front of the mainland just back of the projecting quay of each unit.

There will be two wide paved ways running out each quay to the head of the bulkhead, for the use of automotive vehicles, so that motor truck lines may deliver their freight direct to the shipside in exactly the same manner as continental freight cars. Special loading and unloading machinery for motor trucks is included in the plans for the equipment of each quay, and motor trucks will be handled in the same manner as freight cars, with clearance kept for them throughout the wharf sheds and in the warehouses. While classification yards will not be necessary for motor trucks, large space has been provided alongside the car yards for motor truck use.

Establish "Free Port"

It has been considered necessary to establish a foreign trade zone (free port) on this terminal. There being no inland shipments from this zone, railroad tracks will not be necessary and motor truck distributers are expecting that all this large traffic will create a considerable demand for trucks.

Motor truck lines operating out of San Francisco Bay into northern California and Nevada will have direct connection with trans-Pacific steamers instead of having to ferry across the bay for their cargoes. This will mean a big saving in operation and will probably increase the number of fleets operating.

Plans for the equipment on the quays include ramps on which motor trucks can be driven directly onto any deck of a berth freighter, loaded and driven off again, in case there are any difficulties in the way of loading or unloading a cargo shipside. This will also mean a reduction in operating costs.

Approximately 10,000 miles of highways suitable for the operation of motor trucks and on which motor trucks are now operating will be given direct connection with deep-sea commerce by the construction of the first unit of the new Port Terminal at Berkeley. Connection will also be made between motor truck lines and inland waterways and navigable streams entering San Francisco Bay, as well as with all towns on the 116 miles of water front of that bay.

May Merge Two Western Automotive Associations

SPOKANE, WASH., Aug. 8—Negotiations contemplating a consolidation of the Washington Automobile Chamber of Commerce and the Washington Automotive Trades Association was the most important subject discussed at the annual meeting of the latter association. The consolidation is expected to create a body of greater power.

Discussion of the margin of profit and contracts occupied a liberal share of the attention of the delegates to the annual convention. Several speakers declared that the dealers need a larger margin on their goods and if they hope to get the backing from the banks that they expect the margin must be increased. It also was argued that most of the contracts under which dealers operate at present are unwarrantedly unfavorable to them. The association members want a contract that cannot be taken from them if they live up to its provisions. Crystallization of sentiment on these questions was urged.

OLIVER-BARTH MERGER

MILWAUKEE, Aug. 8—The recent change of corporate style of the Oliver Mfg. Co., Milwaukee, to Oliver-Barth Jack Co., marks the formal consolidation of the Oliver company with the Barth Mfg. Co., both specializing in the manufacture of lifting jacks and similar automotive equipment. The Oliver company, originally established in Chicago, was acquired by Milwaukee interests identified with the Northwestern Malleable Iron Co. of this city about a year ago and the plant was moved to Milwaukee. Now the Barth company has been purchased by the same interests.

Electric Railways After Motor Trucks

Association Opens Nation-wide Propaganda Campaign on Tax Question

NEW YORK, Aug. 10—A nation-wide propaganda campaign in opposition to the widespread use of motor trucks is being conducted by the American Electric Railway Association.

The slogan of the campaign is: "Use the trolleys—Save the highways."

The chief argument advanced against trucks is that they wear out the highways and do not pay a fair proportion of taxes. The campaign is being conducted by a committee of 100, representing traction companies in all parts of the country. This committee, acting through local electric railway companies, supplies the newspapers with "canned" editorials and other material which purports to show why the trolley companies are not being treated fairly because they are compelled to pay taxes and the motor bus freight and passenger car companies have no obligations of this character beyond their license fee.

Make Vigorous Efforts

The efforts of this committee probably are responsible for the vigorous efforts which are being made in many sections of the country, particularly in Connecticut, to curb the operations of motor bus lines which have cut deeply into the profits of street car companies by offering lower rates of fare as well as more convenient and efficient service.

A similar campaign against the use of motor trucks and tractors has been instituted by the Horse Association of America, which contends that farm work as well as the hauling of merchandise can be done more economically and expeditiously by the use of horses.

The latter campaign is just getting under way but it is understood it will attain vigorous proportions.

Immel Stockholders Name New Directors

COLUMBUS, OHIO, Aug. 10 — The stockholders of the Immel Co., which recently purchased the large automobile body plant as well as a large amount of materials from the receiver of the company, met Aug. 3 and named the following board of directors for the new company: A. G. Gilmour, G. P. Hickle, John W. Dinsmore, J. C. Goeller, F. E. Kocher, C. W. McFarland and V. W. Moss.

A name will soon be selected and incorporation papers filed with the Secretary of State. Some question as to the name of the new company has arisen. With the filing of incorporation papers, steps will be taken to put the plant in active operation. It is likely that J. D. Potter, formerly with the Kilbourn & Jacobs Co. of Columbus and later with the American Motor Truck Co., of Newark, will be made general manager.

Rickenbacker to Take Over Everit Plant

New Car Will Be Exhibited at New York and Chicago Shows

DETROIT, Aug. 10—Rickenbacker Motor Car Co., the latest entrant into the Detroit automotive field, will take over the Everit Bros. plant in from sixty to ninety days and will at once tool up for production the first of the year. The first Rickenbacker cars will be exhibited at the New York and Chicago shows and at all leading shows of the season.

The Everit plant, which is owned outright by Byron F. (Barney) Everit, is turned over by him to the Rickenbacker company, of which he is president, for a consideration of $2,000,000. One million of this is paid in stock of the new company and he has subscribed for $1,500,000 more. In the incorporation of the company, as filed here, Everit is shown as practically sole owner of the company's stock but this later will be apportioned to the other men associated in the company, with Everit retaining control.

The automobile painting and trimming business of Everit Bros. will be removed to another plant in Detroit, for the purchase of which Everit is now negotiating. Three plants are under consideration, he said, one of which will be selected in the near future.

Sufficient Working Space

Present buildings of the Everit plant on Harper Avenue will afford the Rickenbacker company sufficient working space for the production of 20,000 to 25,000 cars a year. There is also unoccupied acreage included in the purchase to permit of tripling or quadrupling present capacity should it be required.

When the removal of the equipment of the Everitt plant is started the installation of the Rickenbacker machinery will follow at once. This will be done rapidly, for the company has economized on time by having patterns made for the equipment required, as the development of the car progressed. This has covered two years and ten months and the company is ready to-day with all its patterns for machinery and machine tools.

Every bit of the equipment will be specialized to the last degree, according to the company's plans. Contracts for everything it will require are now being placed. It will start off the first of the year with an absolutely clean slate, with all equipment and material bought at what Everit regards as absolutely bottom prices. In his opinion material prices are now as low as they will get and may show slight advances from this time on.

Details as to prices and specifications of the new car will not be released until the cars are placed on exhibition at the shows. It will be a medium priced car, Everit said, and will be up to the minute in every particular. He regards the outlook for the company as especially bright and declares that its formation now, with material prices at their lowest, will prove particularly helpful in making the car a big factor in the trade.

Bakelite Wins Ruling in Suit Over Patents

NEW YORK, Aug. 8—Judge Chatfield in the United States District Court has handed down a decision sustaining the contentions of the General Bakelite Co. of this city in its suit against the General Insulate Co. of Brooklyn for alleged infringement of patents. The decision is in favor of the plaintiff and declares that the three patents in question, known as the heat and pressure patent, the indurated product patent and the molding patent, all have been infringed by the defendant. The General Insulate Co. used products manufactured by the Redmanol Chemical Products Co. of Chicago but in his decision sustaining the validity of the Bakelite patents, Judge Chatfield said:

"The record shows that in fact the Redmanol company has stood behind the defendant in the trial of this action, and in so far as investigation of the prior art and discussions of questions of patentability are concerned, the Redmanol company has as freely and fully presented its evidence as if the action had been against the Redmanol company for infringement of the plaintiff's patents in the manufacture of the synthetic gum itself."

General Motors Adds to List of Stockholders

NEW YORK, Aug 8—The increase in the number of General Motors stockholders, which has been in progress for the past year, continues. At present there are approximately 66,000 stockholders of all classes, compared with 59,000 three months ago and 31,000 a year ago. The detail of the number of stockholders follows:

	Number of Stockholders	
Classes of Stock:	August, 1921	May, 1921
6% Preferred.....	3,170	3,164
6% Debenture.....	10,107	9,934
7% Debenture.....	9,046	7,847
Common	43,001	37,922
	65,324	58,867

TIRE MAKERS WILL MEET

NEW YORK, Aug. 5—The first of the quarterly meetings of the tire manufacturers' division of the Rubber Association of America will be held Sept. 22. The executive committee will hold its regular monthly meeting the previous day and such recommendations as may be formulated then will be considered at the division meeting. Two important questions under consideration are mileage adjustment and protection against price decline.

Pennsylvania Opens Big A.E.A. Campaign

Jobbers Dine and Hear "Pep" Addresses—Plan Week of Activity

PHILADELPHIA, Aug. 10—Jobbers of the eastern Pennsylvania district successfully launched their part in the national sales promotion movement of the Automotive Equipment Association at a dinner to-night. Upward of 150 proprietors, executives and salesmen of nine jobbing houses met at the rooms of the Automobile Trade Association and after their repast listened to four inspirational and informative addresses on the opportunities offered jobbers and their salesmen to increase their own profits and those of manufacturers and retailers by aggressive participation in the sales promotion campaign.

One of the speakers was Harry C. Spillman of the Remington Typewriter Co.'s educational department, who in the main repeated the brilliant talk on development of personality which he made at the Mackinac Island convention of the Automotive Equipment Association. E. J. Cattell, city statistician of Philadelphia, talked on the mental and moral qualities necessary to successful salesmanship.

T. F. Cullen, managing editor of the *Automobile Trade Journal*, spoke of the need for a campaign of education throughout the trade and suggested methods of participation in it by jobbers and their salesmen.

Neal G. Adair, editor *Motor World*, basing his talk on observations recently made in trips with jobber salesmen and in investigations of accessory selling activities of dealers and garagemen, outlined a program of activity which would enable jobber organizations to attain momentum in the sales promotion movement prior to issuance of detailed instructions for the work from association headquarters.

Jobbers participating in the meeting were: Gaul, Derr & Shearer Co., J. H. McCullough & Son, George W. Nock Co., Cahall Motor Supply Co., Berrodin Rubber Co., Manufacturers Supplies Co., Roberts Electric Supply Co., Standard Supply & Equipment Co., all of Philadelphia, and General Auto Supply Co. of Lancaster.

EDITORS SEE NEW DURANT

NEW YORK, Aug. 10—At a luncheon served at the Long Island City assembling plant of the Durant Motors Corp. about one hundred automobile editors from New York, Brooklyn, Newark and other nearby cities inspected the new Durant car previous to its public presentation on Broadway at the showrooms of the Poertner Motor Car Co. W. C. Durant, the president of the company, made a short address in which he told briefly his own connection with the automobile business, and engineering and other officials spoke.

Wisconsin Opens War on Federal Motor Tax

Manufacturers, Dealers and Owners Band in Opposition to Measure as Added Burden

MILWAUKEE, Aug. 10—The storm of opposition and protest that has arisen in the automotive industries and among users against the proposed national tax on passenger and commercial cars has taken organized form in Wisconsin under the leadership of associations of manufacturers, dealers and owners. Jesse A. Smith, Hudson and Essex distributer, who is president of the National Automobile Dealers Association, said:

"While both the National Automobile Dealers Association and the National Automobile Chamber of Commerce have representatives at Washington fighting to defeat this proposition, we need the united protest of owners added to ours if this tax is to be defeated. While Congress is reported to be lukewarm on the proposal of Secretary of the Treasury Mellon, which is reported to have the support of the President, we are apprehensive, for it is a fond idea of legislators to regard the motor car as a 'luxury,' that owners are wealthy persons, and thus may be taxed at will. Owners now pay a 5 per cent tax on new cars, are required to pay State and sometimes local license fees, personal property taxes, and State and local road taxes. Seventy-five per cent of the passenger cars in this country are used for business, and trucks certainly are business cars. We believe the motor vehicle already is overtaxed, and no additional burden should be imposed."

Bart J. Ruddle, executive secretary and manager of the Milwaukee Automotive Dealers Association, said: "We are maintaining good roads in Wisconsin and paying heavily for them. Why should we also be called on to help some undeveloped State build its roads? We have repeatedly made our case known to members of Congress and we will not halt our efforts in opposition to the proposed Federal tax until it is definitely killed. Vigorous protests also have been made from other parts of the country. There are 9,260,000 owners in the United States and I doubt if Congress will dare to antagonize them further. In addition to all other taxes, motor trucks are compelled to pay an 8 per cent transportation tax and it is not right and proper that the great national transportation system being built up with commercial vehicles should be penalized more than it already is."

DETROIT EMPLOYS MORE MEN

DETROIT, Aug. 10—Reports by the 79 members of the Employers' Association for the week ended July 26 showed 117,572 men on the payrolls as compared with 115,397 for the previous week. The number of part time workers was practically the same as the week before.

LORD NORTHCLIFFE PRAISES BRITISH MOTOR BUS; CALLS U. S. SLOW

WASHINGTON, Aug. 10—Lord Northcliffe, the eminent British publisher, who is now on a tour of the world, is a warm friend of the motor bus. In an interview while he was in this city he declared he could not understand why Americans had been so slow to grasp the possibilities of this form of transportation. He stated that in this respect American cities were lagging far behind those of Europe where motor bus transportation had been brought up to a high standard. He pointed out that in London, during the rush hours, motor buses provide practically incessant and ideal service.

Palmerton to Manage Foreign Trade Bureau

NEW YORK, Aug. 10.—As a part of its plan to co-operate with the Department of Commerce, the Rubber Association of America has granted a leave of absence to P. L. Palmerton, manager of the Foreign Trade Bureau of the association, so that he can accept the position of chief of the rubber industrial division of the Bureau of Foreign and Domestic Commerce.

The Bureau of Foreign and Domestic Commerce proposes to establish from 12 to 15 sub-divisions, each of which will maintain and strengthen the contact between some particular industry and the bureau. The absence of Palmerton will not mean any lessening of foreign trade activities by the Rubber Association. He intends to carry on much of this work in Washington, and if he finds later that this plan is impracticable the work will be handled here.

Anderson August Sales Will Run Ahead of 1920

DETROIT, Aug. 10—Business in high-class custom built cars promises well for fall and winter months, declares General Sales Manager C. B. Shanks of the Anderson Motor Co., Rock Hill, S. C., who was in Detroit this week. August business with the Anderson company will run ahead of sales in August, 1920, he said, after falling slightly under the 1920 totals in July. New territories are being opened by the company in many sections of the country, through the appointment of distributers.

HUNT QUITS NEW YORK REO

NEW YORK, Aug. 8—James J. Hunt, vice-president and general manager of the Reo Motor Car Co. of New York has tendered his resignation effective Sept. 1. Hunt has not been in the best of health lately. He has been with Reo in the New York territory since 1915.

'Midget' Car Appears on Japanese Roads

Built to Meet Peculiar Conditions—De Luxe Engine Used Made in U. S.

SEATTLE, Aug. 10—A new automobile of Japanese production known as the "Midget" was recently placed on the market in Japan. The car was built to meet the peculiar conditions of Japan, taking into consideration local conditions, such as poor roads, narrow streets, high price of fuel and limited buying power of public. The car, which is very small, as its name implies, with a wheelbase of only 84 inches, is manufactured at the Shibaura works of the Far Eastern Automobile Co.

The total weight of the car is only about 850 pounds. The top of the door is 37½ inches from the ground. The engine is a "De Luxe" air-cooled V-twin, developing 12 horsepower, and is made in Indianapolis. Cooling is aided by a belt-driven fan, placed directly in front of the engine behind the false radiator. Ignition is by Bosch high-tension magneto, and lubrication by automatic gear pump, assisted by a hand-operated oil pump. The transmission is selective, with three forward speeds and one reverse. The transmission case is mounted far enough behind the engine to allow for a transmission brake between the two units. The drive is taken from the transmission by a propeller shaft to a live rear axle. Drive is taken through radius rods arranged on the three-point system, somewhat similar to that employed by the Ford.

The body design follows the French practice. The front seat is large enough for the driver only, but the rear seat accommodates two with comfort.

The makers state that the car will average from 25 to 35 miles per gallon, and that its maximum road speed is about 30 miles an hour.

Zee-Zee Rubber Files Bankruptcy Petition

TRENTON, Aug. 10—The Zee-Zee Rubber Co., manufacturers of automobile tires and tubes and doing business through a chain of stores in New York, the New England states, New Jersey and Pennsylvania, to-day filed a petition in bankruptcy in the United States court here. The liabilities are scheduled at $293,552 and the assets at $434,964.

The general business depression is responsible for the failure, according to Herbert P. Backes, attorney for the corporation, who filed the petition. More than one thousand creditors are listed. The plant of the company, at Yardville, a few miles south of Trenton, was built a few years ago and is valued at $392,000, according to the petition. The concern ceased operating the plant the first of this month, throwing many men out of work.

Lesson Is Forced Home by Tax Plan

Mellon Proposal Teaches Congress Owners Consider Cars Essential

WASHINGTON, Aug. 9—One of the outstanding developments of the proposal of the Secretary of the Treasury for a flat levy of $10 on automobiles and trucks is the realization that has come to Congress that 10,000,000 automobile owners regard their machines as essential to their welfare and prosperity. There has been an unmistakable reaction against the Treasury plan and Congressional leaders were quick to voice the sentiment. It now appears that if the automobile is assessed as a means of additional revenue it will be graduated according to horsepower. It is significant to note that nowhere in the tax discussions has the repeal of the excise taxes been favorably mentioned.

The latest tax proposal has awakened the automobile owner to the fact that there is reasonable ground for the claim of the National Automobile Chamber of Commerce that the industry has been singled out for so-called "stigma taxes."

Heretofore, the average automobile owner paid little attention to the fact that he paid a large sum in taxes when the car was purchased. Now that the Treasury wants another assessment, the car owner has figured the total taxes and discovered that national, State, municipal and road taxes placed him in a distinct class in that the total exceeded any other group. The net result is that the industry has gained an ally in fighting discriminatory taxation.

The Secretary of the Treasury has quite unwittingly made the country cognizant of the true position of the automotive industry as it relates to taxation and strengthened it accordingly.

Myers Spark Plug Will Move Plant to Detroit

DETROIT, Aug. 9—The plant of the Myers Spark Plug Co. will be moved from Toledo to this city, following arrangements for the financing of the new Detroit Ignition Co., which has taken over the Myers company. The new company will have a capitalization of $300,000, part of this having been paid over to stockholders in the original company.

It is expected that manufacturing will begin in Detroit soon after the first of the year. Equipment will be installed to permit of a 5,000,000 annual production. It is planned to make intensive sales efforts in leading cities of the country, one city to be taken at a time beginning with Detroit. Advertising will feature the self-cleaning patented mechanism of the plug.

Officers of the company are: C. F. LaFond, president; C. C. Starkweather, vice-president; Clarence E. Lehr, secretary, and Louis H. Turrell, treasurer.

"PRESENT AND FUTURE" THEME OF M. A. M. A. MEETING SEPT. 14-16

NEW YORK, Aug. 8—The central theme of most of the papers and discussions at the credit convention of the Motor and Accessory Manufacturers Association, which will be held at Detroit, Sept. 14, 15 and 16, will be, "Business conditions in the automotive industry and prospects for the future." This subject will be taken up in an open forum discussion from the standpoints of the raw material producer, the parts manufacturer, unit and equipment makers, vehicle manufacturer and dealer. Prominent executives in various branches of the industry will lead the discussion.

Another stimulating feature of the convention will be a symposium on "Selling strategy to bring the automotive industry back to normal." This topic will be discussed by sales and advertising executives.

Receiver Is Named for Kelly Tire and Rubber

NORWALK, CONN., Aug. 8—Former Congressman Augustine Lonergan of Hartford has been named by Judge Edwin S. Thomas of the United States District Court as receiver for the Kelly Tire & Rubber Co. of New Haven. The appointment was made on petition of Attorney Benedict M. Holden of Hartford, representing the stockholders' protective committee, consisting of Vice-President Nathan D. Prince of the Hartford-Connecticut Trust Co. of Hartford, President C. L. Holmes of the Waterbury Trust Co. and President John T. Manson of the First National Bank of New Haven.

Lonergan displaces the Bridgeport Trust Co., Attorney A. H. Barclay of New Haven and Moses Ullman of New York, as joint receivers of the company, under appointment of the Superior Court. The petition for Congressman Lonergan's appointment was granted on the ground that the directors of the tire company committed an act of bankruptcy in having the receivers appointed in the State court and, being a bankruptcy case, it became a matter for the Federal court.

FISK ACTION DEFERRED

CHICOPEE FALLS, MASS., Aug. 9—Special meetings of stockholders of the Fisk Rubber Co. and the Federal Rubber Co. were held here to-day to consider refinancing proposals but adjournment was taken without definite action. The plan calls for the purchase by the Fisk company of all the assets of the Federal company as well as the Ninigret Co. The number of proxies recieved from stockholders since the proposal was submitted is said to have been encouraging.

Truck Industry Asks Repeal of Burke Law

Committee Appeals to Governor to Amend Measure Limiting Weights

CLEVELAND, AUG. 9—A committee of five that represents every phase of the motor truck industry in Ohio went to Columbus to-day and asked Governor Harry L. Davis to provide means for permitting the Burke law limiting the weight of motor trucks to be amended at the special session of the general assembly, which will be held next January.

The committee also discussed with Governor Davis plans for the filing in court of a friendly suit to test the constitutionality of the law, which becomes effective Sept. 5. The Governor was told that the Ohio truck industry and users of trucks were done a great injustice when the bill was passed and they hope to work out a plan of action with him whereby an early amendment to the law may be made and operation of the law deferred until it is changed.

All-Round Committee

Members of the committee are P. A. Lewis, Springfield, of the Kelly-Springfield Truck Co.; W. W. Williams, Columbus, representing dealers; W. C. Freelock, of the Liberty Cartage Co., Cleveland, representing users of trucks; H. A. Waddle of the Goodrich Tire & Rubber Co., representing tire manufacturers, and J. S. Schindle of Cleveland, representing business users of trucks.

Lewis is chairman of the committee, which was named by T. R. Dahl, secretary of the White Co., at a recent meeting in this city.

The committee informed the Governor that if the bill becomes a law these things will happen to the truck industry, users of the vehicles and consumers:

Approximately 15,000 five and seven-ton trucks will be eliminated as a transportation medium; $2,000,000 worth of trucks will have to be scrapped; transportation costs will be increased $5,000,000 because of the larger number of trucks required to haul traffic now handled and the increased number of employees; milk companies will have to pay one cent a gallon more for transporting that product to the cities and consumers and producers generally will have a new load put on their shoulders.

What Measure Means

Under the Burke bill loads allowed on highways are reduced to 20,000 pounds including the truck; weight per inch of tire width is reduced from 850 pounds to 650 for pneumatic tires. Steel tired vehicles are allowed to carry 24,000 pounds and the truck people say this is ridiculous as the steel tired vehicle is harder on improved roads than is the other class of vehicles. When the Governor issues his call for the special session of the Legislature, the committee asked him to set forth amendment of the Burke bill as an order of business.

No Dearth of Sales in Atlanta Field

August Business Holds Up with Other Months—Registration Is Heavy

ATLANTA, GA., Aug. 9—If registration figures at the State Capitol are any kind of barometer of sales conditions, the August total of retail sales in Atlanta will be up to that of any previous month this year. The first week of August there was an average of about 70 licenses issued daily, this including new and used passenger cars and trucks. The trucks are greatly in the minority, while about half of the motor car sales are of new cars. No re-registration is required in Georgia and therefore all of these are bonafide sales, this report covering retail trade in Atlanta only.

As many of these sales were made during July, the buyers waiting until after July 31 to secure their licenses, total sales for the past five weeks have been in the neighborhood of 700 new and used motor cars and trucks.

Cotton Price Rises

There has been a sudden and substantial increase in the price of cotton because of the Government's report on the low condition of this year's crop, and as a result automotive sales in the rural districts and smaller communities are expected to experience considerable stimulus within the next few weeks. Cotton went up about two cents per pound the first week of August.

Optimism as regards the future outlook for the industry in this section was the keynote of the annual sales convention of southeastern Buick dealers held at the Capital City Club in Atlanta. About 150 Buick dealers from Georgia, Florida and Alabama attended the three group meetings, virtually all of them stating they have noted a steady improvement in their business since June 1, with every promise that conditions will continue to improve gradually from now on.

Official announcement of sales by the Buick dealers in the three States since June 1 was made by Byron H. King, manager of the southeastern branch in Atlanta, who gave the number of new cars sold since that date as approximately 1000.

Passenger Car Sales Improve in New York

NEW YORK, Aug. 10—Passenger car sales in the Metropolitan district have been a little better so far this month than was expected by dealers who had carefully reviewed their books for August in pre-war years. Turnover of course is of smaller volume than in July but the decline has not attained the importance of a slump by any means. Buick, Studebaker and Dodge are still selling far ahead of supply as they were in June and July and several other cars are still running strongly.

Every week dealers have been added to the list of those who have all but stopped trading. Buying in the used car market is so close that quite a number of dealers have been taught a sharp lesson on the subject on over-allowance. A few are still taking in owners' cars at figures plainly above what they can get for them but the practice is far less widespread than it was two or three months ago. Several dealers are frankly telling new car prospects to go out and sell their used cars themselves unless they are willing to take a reasonably low price for them.

The question of operating costs is troubling several of the largest distributers who are facing renewals of salesroom leases at rental figures anywhere from 50 to 100 per cent above what they were when they signed their present contracts five years ago. It is probable that there will be several removals this fall and one or two dealers may go around the corner in one of the side streets off Broadway.

Philadelphia Looks for Good August Business

PHILADELPHIA, Aug. 8—A few leading automobile dealers and distributers have asserted that July, particularly toward the end, proved one of the best months in the year for new cars, but for the majority of agencies the period was below June. All agree, however, that August sales, because of an extra spurt of energy, particularly noticeable among nearly all organizations, promise well.

Truck sales are so flat that several dealers talk of dropping them and concentrating on something else.

Repair parts are not selling well, except in rather isolated instances, where special efforts have been made to push them.

Business Conditions Are Satisfactory in Washington

SEATTLE, Aug. 10—While there has been a slump in the movement of cars in several sections of the State during July as compared with the previous month, business conditions as affecting the automotive trade in Washington are satisfactory. Conservative optimism over the outlook for the immediate future and confidence in the consistent improvement of business conditions was expressed both at the annual meeting of the Washington Automotive Chamber of Commerce recently held in Spokane, the annual convention of the Washington State Automotive Trades Association which followed at Tacoma, and the Northwest Buyers Week at Seattle.

The volume of orders booked by merchants generally at the Buyers Week at Seattle far eclipsed expectations and may well serve as an indication of the improving conditions in the State of Washington.

Columbus Business Continues Upgrade

Medium Price Cars Selling Best —Rumor of New Model Hurts Ford

COLUMBUS, OHIO, Aug. 10—A continued improvement in the demand for passenger cars is reported from practically all of the agencies and distributers of Columbus. The business is now definitely on the upgrade. The only exception to the general improvement is the demand for Fords, which has fallen off materially since the newspaper publication of reports, since denied, of the coming of a new model with a possibility of new prices. With the publication of these stories business fell off with a thud and efforts of the salesmen of the various Ford agencies have not succeeded in securing normal business.

In other makes trade is stimulated by the recent price reductions and agencies generally are fairly busy. This applies to cars ranging in price from $800 to $3,500 and in some instances higher-priced cars. But the usual run of business is now for the medium-priced lines and these are showing the best improvement.

The unemployment situation in Columbus is better than was the case several weeks ago. This is an encouraging factor and presages a continuation of the improved demand. It is believed that the worst of the slump is now over and dealers and distributers are making plans accordingly.

Rural Districts Slow

In the country districts trade is still slow, although some improvement is reported. The crop prospects are slightly better with recent heavy rains and the farmers are showing some disposition to come into the market. But little trade is anticipated in the rural sections for some time, as the farmers are not having a prosperous season.

Truck business is still slow with the exception of the demand for light delivery wagons. The heavy truck business is at a standstill and little hope of immediate revival is seen. Heavy haulers have a good supply of trucks and they are not coming into the market as a result.

SHOW MANAGERS NAME ADAIR

CHICAGO, Aug. 10—The board of directors of the National Association of Automobile Show and Association Managers has unanimously chosen Neal G. Adair, editor of Motor World, secretary and treasurer. He succeeds Ray W. Sherman, who resigned when he left the executive editorship of the Class Journal Co. to become merchandising director of the Automotive Equipment Association. E. E. Peake, secretary of the Kansas City Motor Car Dealers Association, is president of the Show Managers and Secretaries organization.

Coast Sales for July 20% More Than June

Generally Favorable Condition in Northern California—Rural Prospects Are Good

SAN FRANCISCO, CAL., Aug. 10—A rather unusual, yet generally favorable condition developed in the merchandising of automotive vehicles, particularly passenger cars, during July in northern California. While retailers reported sales about 20 per cent above those of June, distributors announced that the ratio of country sales to city sales, usually about three and one-half to four to one in favor of the country sales, had fallen to three to two.

To counterbalance this apparent decrease in country sales, however, distributors said they had reports from dealers throughout the rural districts, indicating that prospects were more numerous than they had been in eight or ten months. The condition these outside dealers reported is that the farmers and others engaged in handling products of the soil, are waiting until the money begins to come in for this year's crops before buying passenger cars.

Both country dealers and distributors interpret this as meaning that sales will be considerably better in the latter part of August and throughout September than they have been for some time. The people are going to buy cars, according to these distributors, but they are planning to pay cash for them, and they have to wait until they have the cash to pay. The surprising factor is that so many people are buying, for, in general, sales are considerably above the June record, and are better than they were in July a year ago.

The dealers' associations throughout northern California are highly pleased with general merchandising conditions, and expect improvement ranging all the way from 100 per cent in the centers of distribution in the agricultural sections of the State, to 50 per cent in the largest city—San Francisco. The best feature of the whole situation, however, is that the dealers are not "living on hopes," but are going right along selling cars in sufficient numbers to show good figures on the right side of the ledger. Cash sales are more numerous than they usually are at this time of year, and more prevalent than they have been at any season within the past eighteen or twenty months.

SEVERNS KNOX RECEIVER

MT. VERNON, OHIO, Aug. 10—F. W. Severns, former county treasurer, has been appointed receiver for the Knox Tire & Rubber Co. The petition for a receivership was filed by Edward Elford, who claimed to have a mechanics lien on the property for $6,754. Severns will continue operation of the plant under the direction of the court.

AUTOMOBILE "SAFETY-FIRSTS" WILL FEATURE TRAFFIC CONVENTION

OAKLAND, CAL., Aug. 10—Equipment and "safety-first" men in the automotive industry will have their innings at the annual convention of the International Traffic Officers Association here, Oct. 24 to 29. An exhibition of safety devices, automobile equipment intended to make driving safer and easier, fire-prevention outfits for automotive vehicles, and all manner of safeguards for machinery will be open to the public in the Municipal Auditorium of Oakland, in which the convention will be held. The fire departments of all the cities around San Francisco Bay will demonstrate fire-fighting with the latest automotive equipment; truck fleets will be shown in operation; the handling of heavy traffic on improved highways with minimum damage to paving and other surface will be discussed, and all in all, the automotive industry will play a very large part in the convention.

Cleveland Employing 3.6 Per Cent Less Men

CLEVELAND, Aug. 10—Cleveland automobile and accessory manufacturing establishments were on July 30 employing 3.6 per cent fewer persons than on June 30, according to a survey made by the Committee on Labor Relations of the Chamber of Commerce.

Twelve manufacturing establishments reported in the survey of the automobile industry and on July 31 they were employing 7463 as compared to 7742 on June 30.

Employment figures in all industries show that pay rolls on the average remained about stationary during the month of July. There were 54,165 employed June 30, in the 99 establishments that reported in the survey, while at the close of July there were 54,161.

In the metal and metal products other than iron and steel there was no loss; in the iron and steel industry the loss was 1.3 per cent; a gain of 10.4 in the food and kindred products; a gain of 1.1 per cent in textiles and their products; a gain of 7.3 per cent in lumber and its manufacture; a gain of 5.9 per cent in paper and printing and a gain of 5.2 per cent in chemicals and allied products.

WEIGEL LEHIGH MANAGER

NEW CASTLE, PA., Aug. 5—D. W. Weigel has assumed the management of the Lehigh Tire & Rubber Co., formerly the New Castle Rubber Co., recently purchased at receiver's sale by F. A. Seiberling. It is understood Seiberling will come here personally in a few days to supervise the resumption of operation. It is proposed to make about 500 tubes a day.

Unit Parts Orders Preface Sales Gain

General Business Spurt Declared Certain to Follow Turn of the Year

DETROIT, Aug. 10—General improvement in passenger car business in September and October, with gains for each month over the month before, is indicated in orders now being placed with some of the leading unit part makers. November and December are expected to show a falling off, but a general sales spurt all along the line is declared certain to follow the turn of the year and the opening of the show season.

Many of the car manufacturers are already planning a manufacturing schedule in anticipation of spring business, which they will get under way in December. Some of the others are known to be outlining a schedule which will start off promptly the first of the year, while the remainder will await the opening of the actual selling season and trust to ability to speed up quickly, to meet demands.

All of these arrangements depend to a large extent upon the financial position of the different companies. The stronger companies will start to stock up first and will build a little higher than the others. There has been much conjecture on just what the attitudes of the companies would be toward preparing for spring sales, and apparently the first impression that little stocking would be done is proving wrong. The spring of 1922 will find, however, many thousands less cars piled up than was the case in '21.

Passenger car production in all Detroit factories to-day is being held strictly to sales levels, and there will be little accumulation of cars before December. This is far different from the situation last year which resulted in the storing up of so many cars over the fall and winter months.

There is little sign of parts business from truck manufacturers.

WESTCOTT MAKES CUTS

SPRINGFIELD, OHIO, Aug. 10—The Westcott Motor Car Co. announces reductions in its various models effective Sept. 2. In the "lighter six" line the roadster and touring car will be reduced from $2,290 to $1,890; the sport model from $2,390 to $1,990; the coupé and sedan from $3,390 to $2,890. In the "larger six" line the seven passenger touring car will be reduced from $2,990 to $2,090; the sedan from $4,590 to $3,490 and the limousine sedan from $4,690 to $3,690.

FORD MAY GET SHIPYARD

BOSTON, Aug. 10—The Ford Motor Co. may buy the Victory plant at Squantum, an emergency shipyard, if Mayor Bradford of Quincy is successful in completing negotiations on behalf of the Government.

Pierce-Arrow Trucks and Cars Reduced

Commercial Bodies Already Down and Passenger Cars to Be Cut Sept. 1

BUFFALO, Aug. 10—The Pierce-Arrow Motor Car Co. has made sharp reductions in the prices of its trucks. The prices follow:

	New Price	Old Price
2 ton	$3200	$3750
3½ ton	4350	4950
5 ton	4850	5700

Prices of various models of Pierce-Arrow passenger cars will be reduced Sept. 1. George M. Graham, vice-president of the company, said to-day this would be the first drop in prices since rising costs forced them up. Graham declined to state what the new prices would be, but added that they would be announced next Monday. It is learned, however, that the touring car will be reduced $1,000 from $7,500 and the closed models from $500 to $750.

COLUMBIA MOTORS CUT

DETROIT, Aug. 8 — The Columbia Motors Co., will reduce the prices of both the regular and Challenger lines, effective Aug. 15. Following are the old and new prices:

De Luxe touring, 5 pass., $1,475, was $1,795; sport model, 4 pass., $1,475; roadster, 2 pass., $1,475, was $1,795; coupé, 4 pass., $2,295, was $2,495; sedan, 5 pass., $2,350, was $2,595; Challenger touring, 5 pass., $1,195, was $1,495; Challenger coupé, 4 pass., $1,995; Challenger sedan, 5 pass., $1,995.

The general specifications and standard manufactured units remain exactly as before in both the models, but refinements and changes in general appearance have been made in the bodies and the equipment has been changed slightly.

WILLS CARS REDUCED

MARYSVILLE, MICH., Aug. 10 — Having attained a sufficient volume of production, C. Harold Wills and associates have made a readjustment in retail prices effective Aug. 5 as follows: Roadster, $2,785, was $3,275; touring car, $2,875, was $3,275; coupé, $3,750; sedan, $4,100. No prices had been previously set on the enclosed models, as none have been in production. Work is well under way on these now, however, and deliveries are expected by September 1.

RUBBER COMPANIES MERGE

ATLANTA, GA., Aug. 9—The Victory Rubber Mfg. Co. has been completely reorganized here, the organization including consolidation with the Cotton States Rubber Mfg. Co., and a general enlargement of the production of rubber products. G. J. Reuter is president of the new company, and also general manager. Other officers are S. S. Shepard, treasurer; Dr. W. P. Glover, A. L. Waldo and W. J. Burks, directors. The Victory company manufactures Seal-tyte tubes.

DUESENBERG INFRINGES ON PATENTS IS CLAIM IN FRANCE

PARIS, July 28—Claiming an infringement of their patents on hydraulic 4-wheel brake systems, the Rolland-Pilain Co. of Tours made a descriptive seizure of one of the Duesenberg cars at Le Mans to-day. This action was taken, declared the Rolland-Pilain Co., in order to protect its legal rights in this system of braking. The seizure was merely of a technical character and does not tie up the cars or interfere with any of the arrangements made for shipping them back to America. Rolland-Pilain exhibited a hydraulic braking system at the Paris show in 1910, and although never having been in production intends to put his brakes on the market next year. The Duesenberg brakes are built under license obtained from an American company.

Martin Parry to Open Seven New Branches

NEW YORK, Aug. 8—Seven new assembling and distributing branches will be opened in the near future by the Martin Parry Corp. They will be located in Philadelphia, Cleveland, Pittsburgh, Detroit, St. Louis, Kansas City and Newark. The same number of branches now are in operation. The purpose of opening the new stations is to carry a complete line of commercial bodies, relieving dealers from the necessity of tying up money in body stocks and to satisfy growing demands for sectional bodies. The plant of the company at York, Pa., is running at capacity and the Indianapolis plant on a 50 per cent basis. Sales for the first six months of the year were about $2,300,000.

FORD CUTS IN FRANCE

PARIS, Aug. 1 (By Mail)—Ford announces another cut in price for the French market. The touring model with electric lighting and starting is now sold at 12,150 francs, or without electric equipment 10,950 francs. These prices are for delivery at the Bordeaux assembly plant, and include the French luxury tax. Price of the chassis only is 8100 francs without electric equipment and 9350 francs with lighting and starting. The 1-ton Ford truck is listed at 10,375 francs, the 2-seater sedan at 17,275 francs, and the 3-seater sedan at 19,850 francs.

MOLINE HAS FUNDING PLAN

CHICAGO, Aug. 10 — The creditors' committee of the Moline Plow Co. reports that approximately 100 per cent of all outstanding obligations have been filed with it and that plans for funding the company's floating debt and the issuance of new securities to general creditors are assured of success.

Expect Ternstedt to Produce at Capacity

Body Hardware Makers Look for Busy Period After Taking Over New Plant

DETROIT, Aug. 10—The Ternstedt Mfg. Co., through the acquisition of the England Mfg. Co. and the body hardware plants of the Fisher Body Co., now the largest manufacturer of automobile body hardware in the world, is going into production on a scale which it is estimated will carry it practically at capacity for the balance of the year. The company has been operating at capacity for 60 days, and President Paul W. Seiler declares orders on hand will carry it at full speed indefinitely.

Present business is running at 80 per cent closed body business, and Seiler looks for an increased closed body trade as the season advances. There is a decided trend, he said, toward the inclosed type of car for all-season use.

The company has just completed its new plant No. 2 and has finished moving in all equipment purchased from Fisher. The England factory will be continued as plant No. 3. The original Ternstedt plant continues as plant No. 1. With the completion of its factory arrangements the company is devoting its attention to standardizing body hardware.

Officers of the new organization are: Paul W. Seiler, former Ternstedt company general manager, president and general manager; C. P. Parsons, formerly president of the England company, vice-president; M. T. Boden, formerly auditor of Ternstedt, treasurer; C. R. Bitting, secretary; T. P. Archer, formerly superintendent of Ternstedt, factory manager; David Humphrey, sales manager, and F. M. Wardle, advertising manager.

Hopes to Push Through Highway Legislation

WASHINGTON, Aug. 9 — Senator Townsend, of Michigan, Chairman of the Senate Committee on Postoffice and Post-roads, is making a determined effort to dispose of highway legislation before the Congress votes a recess or adjournment. The committee will probably report by unanimous agreement a highway bill embodying the distinctive features of the so-called Townsend bill and a modified form of the Phipps-Dowell bill.

The Senate intends to provide for the establishment of a Federal Highway Commission—a principle which has the indorsement of the President and is advocated by the National Automobile Chamber of Commerce and affiliated organizations. While it is expected that some opposition will develop to the commission plan, belief is expressed that sufficient votes will be mustered to pass it.

Franklin Company Has Pension Plan

Syracuse Manufacturers Decide on $250 a Year as Minimum —Follows Much Study

SYRACUSE, Aug. 10—A pension plan whereby a minimum of $250 a year will be paid employees as a reward of long and faithful service has been announced by the H. H. Franklin Mfg. Co., effective at once. The maximum is based on average earnings over a period of years.

The decision follows more than a year of study and investigation by H. C. Blagbrough, head of the industrial relations department, and George S. Dutcher, employment manager, during which they visited several large factories in the East which have adopted similar plans.

The plan is to be administered by a board of directors consisting of four company executives and the president of the mutual benefit society, which will be known as the annuities committee. It will run the plan absolutely, save that all decisions granting special annuities shall be subject to the approval of the executive committee of the company.

The plan provides for retirement on regular allowance after 20 years' service of male employees who have reached the age of 70, or women employees who have reached the age of 55, at their request; at 65 and 55, respectively, at their own request or without, at discretion of the annuities committee; after 10 years, if physical examination shows the employee to be totally incapacitated and incapacity is not covered by workmen's compensation laws, or whose retirement because of advancing years is deemed advisable.

Payments which may be authorized are 1½ per cent of the average pay for 10 years preceding retirement, but not less than $250. Annuities will be paid monthly by check and their grant does not militate against a beneficiary entering other employment not prejudicial to the interests of the company.

Grant Longer Credit to Midwest Engine

INDIANAPOLIS, Aug. 9—A two years' extension of credits, dating from June 27, which was asked the creditors of the Midwest Engine Co. because of the industrial depression which has made it difficult for the company to liquidate its inventory, has been granted, this representing more than 90 per cent of the face value of the claims. No change in the personnel of officers of the company is contemplated by this plan, but the creditors' committee, which is to be appointed and will consist of five men either creditors or representing creditors, is to co-operate in the company's management.

Motor Cars New Rival for U. S. Railways, But— Trade Paid $100,000,000 for Freight in 1920

NEW YORK, AUG. 8—The New York *Times* prints an editorial headed "Railways and Automobiles," which says:—

"It is announced that the Boston & Maine Railroad has abandoned two branch lines on account of automobile competition. So many preferred to ride in motor cars that the trains averaged only two or three passengers. The total freight revenue of one of the lines in 1920 was $88. The other collected in 1920 $1,713, with operating expenses of $12,940. It was a case of short lines for summer travel. They never will be missed.

"The railways have no need of jealousy or fear of their rival, amazing though its growth has been. The automobile trade paid the railways $100,000,000 for the year last reported. The automobiles of the farmers are feeders of the railways. They have expanded the area capable of economic cultivation, so that the railways get quantities of freight which never would have come into existence if the farmers still depended upon horses. It is difficult to place a limit on the growth of the industry which already has produced 11,000,000 machines. At the beginning of this year there was one car for each twelve of the population. The productive capacity of the country is a million cars more than enough to maintain the present total in operation."

Result of Grand Prix Discussed in England

LONDON, July 29 (*By Mail*)—The sweeping victory of the Duesenberg cars in the French Grand Prix has caused considerable comment here. The outstanding facts are these:

(1) While Britain officially retired from the race, it is stated for lack of time to prepare and test the cars and the route, America took the risk and triumphed.

(2) The British cars which were raced as a private entry by the drivers, all credit to them, cut a sorry figure, due mostly to tire troubles, finishing at the tail of the list, whereas the American cars, though of single make and identical in detail, scored together closely.

(3) The press-men have not failed to note that the Duesenbergs are production, or commercially possible cars and not special cars impossible to build at the price the public will pay.

(4) The result of this victory effectively disposes of the delusion that American cars are inefficient from lack of European experience in design, etc. It now only remains for the Duesenberg Co. to disclose its European price for this car.

It should be added that many British spectators of the race have agreed that four wheel brakes were a big, if not the chief factor in helping the Duesenberg win, and it is agreed that such brakes will be indispensable in motor races. Other competitors were held back by the longer period taken for retarding and accelerating to the required pace.

GUYOT'S TIME UNDECIDED

PARIS, Aug. 1 (*By Mail*)—In issuing the officially accepted times for the French Grand Prix race, the Contest Board reserves its decision regarding Albert Guyot's Duesenberg, placed sixth. On bursting a tire Guyot slipped into soft ground, and the claim is made that spectators helped to push him out. The rules of the race are that no outside assistance of any kind must be given the competitors.

Say Trade Publicity Is Needed in Britain

LONDON, July 29 (*By Mail*)—A correspondent of *The Times Trade Supplement* this week discusses last week's overseas trade conference here. Points emphasized by this writer are:

Need for more effective trade propaganda abroad.
Need for a range of "comparatively rough" accessories of British make on standard lines.
Need for low and high powered motorcycles, large single cylinder engines excepted.
Need for air tired 3000 lb. capacity trucks, at lower prices than at present.
Need for vehicle makers to co-operate more with traders and parts-makers and to take more concern in such items as tires and other parts not made by themselves but essential to their products.
Need for larger and stouter tires on average British vehicles.
Reform in British auto taxation so as to enable a large cylinder bore to become normal for cars.

Virtually these recommendations and suggestions point to American ideals as to design, lay-out and mode of selling. The *Times* writer, however, seems to overlook the all essential fact that capital and co-operation among automobile makers are indispensable to any scheme involving a standardized product and adequate propaganda overseas, and it is just this factor which, while for years advocated and enlarged upon by competent critics, seems little nearer realization than ever.

Just now the main problem is finance which faces most British manufacturers.

THIRD IN RACE MUST BE FRENCH

NEW YORK, Aug. 10—A cable dispatch from France says that as a result of American made automobiles winning the Grand Prix, the sporting committee of the Automobile Club of France has decided that in the race next year entries will be open to the world but that unless one-third of the cars entered are French, as well as one-third of the manufacturers represented, the club reserves the right to call off the race. The club feels that this puts the question squarely up to the French automobile makers who must provide the required proportion of French contestants if they want the race run.

METAL MARKETS

WHILE a slowing up of the downward movement in prices is most decidedly in evidence, steel buyers are apparently convinced that they have nothing to lose by committing themselves for their more immediate requirements and to this sentiment is to be ascribed the impressive volume of business placed in the last ten days for immediate shipment. This condition holds especially true in the case of the sheet rolling mills which are working at approximately double the rate of operations in vogue in other branches of the steel industry. A considerable portion of sheet business for immediate shipment emanates from the automotive industries. That producers are eager to place their present ratio of operations on a more permanent basis is only natural and several are asking buyers to place orders for deferred deliveries, prices to be determined on the basis of the market at the time of shipment. Non-integrated sheet mills which cater to the automotive industries contend that bargains in sheet bars have disappeared from the semi-finished steel market and that on the present basis of $32 for sheet bars they are unable to shade prices for full finished sheets further. All in all, the next week or two should reveal clearly whether the present buying movement is merely a flash in the pan or the beginning of a genuine resumption of lasting activity. As stated previously, steel makers are devoting considerable attention to measures designed to bring down freight rates. This movement now appears to have crystallized into more concrete form. Report has it that a conference of "independents" is to be held in New York in the near future and that on that occasion energetic steps will be taken to secure a 20 per cent reduction in freight rates. Should this movement be fraught with success, consumers will undoubtedly derive a large share of the saving accruing therefrom. In the pig iron market conditions are becoming more and more settled from day to day and, as one large blast furnace representative puts it: "Bargain hunters are not having the picnic to-day that they did a few weeks ago."

Pig Iron.—Most of the sales to automotive foundries are for prompt shipment but some inquiries are out for deliveries over the third and fourth quarters. Some of the sales agencies and blast furnaces are disinclined to accept future business at present low quotations.

Steel.—Most of the buying of cold-drawn steel bars by the automotive industries continues in less than carload lots, although the leading low-priced passenger car builder recently took 800 tons of cold-drawn in a 3,000 ton lot of miscellaneous steel. Some makers quote 2.50c. which allows $15 for conversion of 1.75c. hot-bars. The Corporation seems to be quoting 2.75c. but is protecting its regular customers by meeting the lowest quotation they can get from "independents." Small tonnage buyers of strip steel are more numerous and automotive parts producers are placing orders for a few carloads at a time. As low as 4c. has been quoted on cold-rolled and 2.40c. on hot-rolled, although the general cold-rolled quotation given is 4.25c. with up to 2.60c. asked for hot-rolled.

Aluminum. — The "outside" aluminum market is demoralized. London cable state that, although the nominal quotation is 125 Pounds Sterling for export business, sales have been made at as low as 100 Pounds Sterling f.o.b. At the present rate of exchange this latter figure is the equivalent of 16c. per lb. In 300 ton lots prompt shipment aluminum has been offered in this market at as low as 18c. per lb., duty paid, f.o.b. New York.

Copper.—Producers and speculative holders are seemingly willing to cut prices to the bone in order to obtain funds.

Tin.—The market is still feeble and correspondingly attractive to bargain hunting speculators.

FINANCIAL NOTES

Moline Iron Works, Moline, Ill., has increased its capital from $500,000 to $750,000. Reports on business for the past year made to stockholders at their annual meeting were gratifying and it was said the outlook for the coming year was favorable. The automobile accessories branch of the company has done a substantial business since it was established. L. E. Nutt continues as president of the company.

Wright Aeronautical Corp. directors have declared on inital dividend of 25 cents a share on the 224,390 shares of capital stock now outstanding. The report of the company for 1920 showed net earnings after all deductions of $411,349, equal to $1.88 a share on the stock. The gross sales were $1,486,000.

J. I. Case Threshing Machine Co. reports that sales for the first seven months of 1921 have increased month by month and now amount to approximately $10,500,000 which was 45% of 1920 sales, 54% of 1919 sales, 71% of 1918 sales and 143% of 1917 sales for the same period.

Spicer Mfg. Co. in a balance sheet as of December 31, 1920, shows cash amounting to $455,425; inventiries of $6,292,263; accounts and notes receivable, $1,810,633. Notes payable come to $2,852,691, accounts payable $867,047 and surplus $2,007,846.

American Bosch Magneto Corp. showed an operating loss of between $40,000 and $50,000 for the half year ended June 30. The company owes only $400,000 on current accounts against which there are $5,700,000 of quick assets.

H. H. Franklin Mfg. Co. directors have approved issuance of $2,500,000 additional 7% cumulative preferred stock of the $15,000,000 authorized. This brings the total outstanding to $6,636,600.

McCord Mfg. Co. has announced that 10% ($450,000) of indebtedness to banks and creditors will be paid Aug. 11, together with $150,000 interest, with money acquired from reduction of inventories.

Goodyear Tire & Rubber Co. has placed on sale the new issue of prior preference stock. The issuance of this stock marks the final steps in the Goodyear Company's $85,000,000 refinancing program.

The White Co. has reduced bank loans $2,500,000 since March 31. The company has been selling trucks faster than they have been produced since the price cuts a few weeks ago.

Hendee Mfg. Co. during July reduced its quick liabilities $189,000 or from $492,000, to $303,000, of this reduction $140,000 was in bank loans, which now stand at only $100,000.

Kohn Mfg. Co., Milwaukee, manufacturing spark plugs, has filed schedule on a petition in bankruptcy, showing assets of $47,554 and admitting liabilities of $34,747.

D. C. Wills, chairman of the Fourth Federal Reserve District, announces that the district discount rate on all classes of paper has been cut from 6% to 5½%.

German Car Makers Gaining Foothold

American Correspondent Describes Plan to Open Foreign Markets

CHICAGO, Aug. 9 — There recently have come to the United States from many sources reports that German automobile manufacturers were gaining a strong foothold in various countries for passenger cars and trucks which can be manufactured more cheaply there than in the United States. Substantiating these reports, the following wireless dispatch has been sent to the Chicago *Daily News* by George Witte, its correspondent in Berlin:

"Scores of the Americans who constitute the vanguard of the army of travelers and who have invested from 200,000 to 400,000 marks, or $3,000 to $6,000, in German automobiles de luxe say that they could not possibly buy machines as good as these for twice the money in the United States. If these instances are an indication of what will happen as soon as Berlin is visited by as many Americans as before the war, then the automobile manufacturers in the United States will have to look out.

"To-day Germany has more than 100 automobile factories, employing 50,000 skilled workmen. All are turning out high grade cars, of which 75 per cent are solely for export purposes. There is no market in Europe or South America to-day for cheap cars. The German makers argue that people who can afford to run cars with gasoline at 50 cents a gallon want something showy for their money.

"In Magdeburg, the center of the automobile industry, the writer found the factories with enough orders on hand to keep them running for 18 months, and give them a financial basis for extensions on a large scale. Owing to the cheapness of labor, steel, iron and other materials, the factories are able to offer for sale handsome cars with good engines at from one-third to one-half the standard American prices. As a result, Germany already has taken the lead in the Swiss automobile market away from the United States. Last year Germany exported to Switzerland automobiles valued at about 18,000,000 Swiss francs (approximately $3,600,000) while the United States exported to the same country only about 16,500,000 francs, ($3,300,000) worth of motor cars. Altogether Germany exported 20,000 automobiles of various kinds and 4000 motorcycles in 1920, while in the last year before the war she exported 6400 cars and 2700 motorcycles."

KAHN LIABILITIES $34,747

MILWAUKEE, WIS., Aug. 9—The Kahn Mfg. Co., Milwaukee, makers of spark plugs, recently declared bankrupt, filed schedules admitting liabilities of $34,747 and claiming assets of $47,554.

MEN OF THE INDUSTRY

Mason B. McLaughlin of Cleveland, who has been manager of the central sales department of the White Co. for a number of years, has been promoted to a vice-presidency of the corporation. The action was taken at a meeting of the board of directors held here last week. Robert A. Woodruff, manager of the southeastern department of the company, was also named a vice-president. McLaughlin and Woodruff, with vice-presidents James A. Harris and George F. Russell, will have headquarters at the general offices, from which they will direct sales all over the world. They are to compose a sales committee, a new body which has been established.

H. J. Edwards has resigned as manager of the Elyria plant of the Willys-Overland Co., where all the engines for Willys-Knight cars have been made. Edwards is one of the pioneer designers of the automotive industry. He designed the Stoddard-Dayton car, and when it was taken over by the United States Motors Corp. went with that company. In 1911 he designed the Edwards-Knight engine and established a factory in New Jersey. His engine rights later were purchased by John N. Willys and the motor has been used in the Willys-Knight car. Edwards has been with Willys continuously since that time.

A. J. Banta for years manager of the Chicago branch of the Locomobile Co. and more recently manager of the Maxwell Sales Co. of Chicago has been appointed general manager of the Clydesdale Motor Truck Co. of Clyde, Ohio. He is familiar with both the sales and manufacturing end of the truck business having merchandised Riker trucks as Locomobile manager. He formerly was associated with the production department of Maxwell and prior to that was in charge of production at the Premier plant

D. H. Roberts, sales manager of the Latex Tire & Rubber Co., Fond du Lac, Wis., resigned Aug. 1 to accept a similar position with the Sangamon Rubber Co., Springfield, Ill., which formerly was known as the Wilson Tire & Rubber Co. Mr. Roberts is succeeded in the Latex organization by Harry Benner, who was assistant sales manager.

W. R. McCulla has been appointed district manager of the Bijur Motor Appliance Co. with headquarters in Detroit. He has had a long record of engineering experience with the Packard Motor Car Co., the Willys-Overland Co. and other automobile manufacturers.

Harvey J. Mallory, controller of the Buick Motor Co. has been elected a vice president of the company but will continue as controller. He succeeds C. H. Mott recently made chairman of the advisory committee of the General Motors Corp.

Guy W. Vaughan, who has been with the Van Blerck Motor Co., Monroe, Mich., for two years as vice-president and general manager, has resigned as general manager, but remains as vice-president and a member of the board of directors.

B. Edwin Hutchinson, for four years treasurer of the American Writing Paper Co., Holyoke, Mass., has resigned to assume a similar position with the Maxwell Motor Co. and the Chalmers Motor Corp. in Detroit.

August J. Luedtke, secretary and treasurer of the Milwaukee Corrugating Co., a large metal working concern of Milwaukee, has been elected vice-president of the Concordia Fire Insurance Co., Milwaukee.

Vern E. Burnett has been appointed advertising manager of the Cadillac Motor Car Co. He recently resigned as advertising manager of the Liberty Motor Car Co.

H. N. Schwarze, electrical engineer for the Cadillac Motor Car Co., has resigned to join the engineering staff which is being organized by R. H. Collins.

T. J. Turk, who has been manager for the receivers of the Spacke Machine & Tool Co., Indianapolis, axle division, for the last year, has resigned.

A. B. Fletcher, state highway engineer of California, will be appointed director of the new department of public works.

INDUSTRIAL NOTES

Westinghouse Electric & Mfg. Co., East Springfield, Mass., has added 200 men to the working force in the last two months. This month the firm will ship 7000 starting motors and lighting generators with ignition accessories in proportion, for automobiles.

Reynolds Spring Co., Jackson, Mich., has plans for the erection of a new building, 132 x 204, two story and a trackless trolley system running between the Ostego and Water street plants. July was the best month of the year for the company.

E. L. M. Tire & Rubber Co. of Racine, Wis., is now operating its new plant of about 20,000 sq. ft. It was organized several months ago with $200,000 capital and absorbed the E-Z Rubber Mfg. Co. of Racine. E. L. McKim, heads the new concern.

Marathon Rubber Products Co., Wausau, Wis., which recently took over the entire property of the Burlock Rubber Co., has plans for a brick and steel factory addition, to be ready about September 1.

Hood Rubber Co. sales for the first six months of the year were nearly up to the total for the first half of 1919, though some $5,000,000 behind the figures for the same period a year ago.

Jasper Tire & Rubber Co., Jasper, Ind., and all of its tire, fabric and rubber for the making of tires will be sold at a private sale soon by Louis Mehringer, receiver.

Rolls-Royce of America has just completed its 100th car. Production for the year is expected to be about 300. Some of the cars will be shipped to England.

Ford Motor Co., of Canada's plant which was closed Aug. 1 for inventory will reopen August 16.

Sills Has Chevrolet Branch in New England

BOSTON, Aug. 1—W. C. Sills, formerly sales manager of the Chevrolet Motor Co., today took over the entire property of the Chevrolet Motor Co. of New England. He has formed the Sills-Chevrolet Company and will act as distributor for the company in this territory. Included in his purchase is the retail sales and show rooms on Huntington Ave., the wholesale department at 100 Cunnington St., and the large service station in the Shoe and Leather Building at Cambridge. He is reorganizing the entire three departments and he will have with him some men who were identified with Chevrolet sales in other parts of the country.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Clearly there is a great amount of money seeking highly liquid forms of investment. Secretary Mellon announced that the subscriptions to the recent offering of $300,000,000 of Treasury Certificates amounted to no less than $1,030,000,000 of which $524,000,000 came from the New York Federal Reserve District. A total of $376,362,500 was allotted.

The vast amount of capital for short term investment caused the abnormal drop in call money rates to 3½ per cent in New York on August 4 and this rate, so far below the general market for time loans, together with the requirements of the crop moving season, have tended toward the withdrawal of funds from the call money market. As a result the tendency last week was slightly upward, the range being 4½ to 6 per cent against 3½ to 5½ per cent in the previous week.

The stagnation in stock exchange speculation made the demand for call money as small as was the supply of this class of money, and the week closed with a rate of 6 per cent. The demand for time money also continued light and the offerings were few, the rate ranging from 5¾ per cent to 6 per cent for all maturities from 60 days to 6 months. A few loans with all industrial collateral were put through at a ¼ of 1 per cent above this range. Commercial paper rates for choice names and all maturities were quoted around 6 per cent, with a rate of 6¼ per cent for secondary names.

The statement of the position of the 12 Federal Reserve Banks on August 3 shows a decrease of bills on hand for the week of $22,341,000 to $1,647,579,000. Deposits in the member bank reserve account declined also by $18,717,000, but as a consequence of an increase in Government and other deposits the total deposits of the system actually increased $9,792,000 to $1,705,066,000 on August 3. Note circulation declined less than $1,000,000 to $2,536,673,000 in contrast with a decrease of $27,000,000 in the previous week.

Gold Holdings Increase

Gold holdings on the other hand increased $21,582,000 chiefly through the acquisition of imported gold. This is about the same increase as during the previous week. Gold holdings stood on August 3 at $2,552,832,000, but a decline of $3,035,000 in legal tender notes, silver, etc., brought the total reserves to $2,703,843,000.

As a consequence of these changes the ratio of total reserves to deposit and Federal Reserve note liabilities combined advanced from 63.4 per cent on July 27 to 63.7 per cent on August 3, and the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, advanced from 82.4 per cent to 83.1 per cent.

Calendar

SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 28 - Oct. 8 — New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January — Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.

Feb. 6 to 11 — Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment. La Pabellon de las Rosas. Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery. Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg. Agricultural Sample Exhibition.

Sept. 5, 1921 — Constantinople, Traction trials under the direction of the Turkish Ministry of Agriculture.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12 — London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

March, 1922 — Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922 — Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Associcao Automobilista Brazileria.

CONVENTIONS

Sept. 14-15-16—Detroit, Credit Convention Motor and Accessory Manufacturers Association.

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

RACES

Labor Day — Uniontown, Pa., Autumn Classic.

Annual Licenses Show Increases in England

LONDON, July 10 (By Mail)—Ministry of Transport statistics show that licenses were in force on May 31 for approximately 853,900 motor vehicles.

The most marked increase in that of "motor-hackneys" annual license, for which now number 64,000 compared with 40,500. The licenses for these vehicles in the second quarter of the year were 32,500 compared with 1200 in the first.

The horsepower class, which includes all private cars, shows an addition of 2000 annual licenses, while the quarterly licenses have increased from 14,000 in the first to 36,000 in the second quarter —an indication that a large number of cars were laid up until the summer as a means of saving the tax.

On May 31 licenses were in force for 226,000 private cars, compared with 185,700 in 1920, 370,000 motorcycles compared with 278,600, and 96,500 motor-hackneys compared with 71,400.

The amount of revenue collected from Jan. 1 to May 31 was £8,750,000.

Toledo Tractor Makers Again Cited to Court

TOLEDO, Aug. 10—The Automotive Corp., manufacturers of tractors here, is involved in further legal entanglements here in the Federal Court, where Judge John M. Killits appointed Fordyce Belford, master in chancery to handle the case for an indefinite time. The matter of appointing a receiver is held under advisement by the court.

It is claimed that the company has violated the "blue sky" laws by selling its stock for $25 a share when only $14 cash ever got to the company treasury.

It is claimed also that salesmen for the promoters declared the company had contracts amounting to $2,250,000 worth of tractors, while the petitioners aver that less than $1,000 is deposited with contracts which total only a few thousand dollars.

The complainant also points out that the corporation took over the Cyclomobile Mfg. Co., which is nil and has no visible assets. A. H. Wyatt is president; William Hulin, secretary-treasurer; and John L. Larkin, vice-president. The company has a factory in operation here and has built a few tractors.

Sterling Executive to Direct New Company

MILWAUKEE, WIS., Aug. 9—Executives of the Sterling Motor Truck Co. of Milwaukee appear as the principals in the incorporation of the Motors Acceptance Co. of Milwaukee, which has been organized with an authorized capitalization of $200,000 to do a general trade and commercial acceptance business, handling automotive business especially. The incorporators are Frank Luick, secretary, and Oscar E. Held, treasurer, of the Sterling Company, and Victor L. Brown, 1428 First Wisconsin National Bank Building, Milwaukee, one of the founders and for many years president of the Sterling company, who retired from office about a year ago to engage in financing affairs.

Form New Organization to Handle Bell Trucks

OTTUMWA. IOWA, Aug. 9—The Bell Truck Sales Corporation has been organized at Ottumwa, Iowa, to take over the sale of the output of the Iowa Motor Truck Co., manufacturers of the Bell truck.

The new company is headed by Paul T. Browning, who is well known in the automotive industry, having been connected with General Motors for several years in the Buick division. He has been more recently with Sheridan Motors. Jack Miller, who has been with the Iowa Motor Truck Co. as sales and advertising manager, is secretary and advertising manager of the new corporation.

Former Goodyear Man Becomes Manufacturer

AKRON, Aug. 9—The Falor Mfg. Co., Inc., headed by Shelby A. Falor, a former Goodyear official, has started production in its new factory in South Akron and will continue on a production basis of about 400 automobile tubes daily. It is announced the company will specialize in the manufacture of automobile tubes. Falor was with Goodyear for over 20 years as director of the sales department. He developed the Goodyear field in motorcycle tires.

For the past three years he was a member of the Goodyear board of control. He resigned when the board of control was abolished under the new financial control of the company and when the office of comptroller was substituted for it by E. G. Wilmer, successor to F. A. Seiberling as president.

Philippine Railways Seek Doom of the Motor Bus

SEATTLE, WASH., Aug. 10—A vigorous fight is being made by railroad interests in the Philippine Islands, led by the Manila Railroad Co., to eliminate the automobile stages from the passenger and freight-carrying business in the Islands. Legislation to place prohibitive fees on the stages is being sought from the legislature of the Islands.

Public opinion in the Islands, according to the latest newspapers received here, is back of the automobile interests. Facts and figures showing the great development of motor vehicle transportation in the United States are being used with telling effect.

If the government considers it just and fair to the public, to kill the auto truck lines merely to save the railroad why not carry the governmental interference with business still further and deny the garages the right to hire cars to persons desiring to go to any place to which a train might carry them? asks one Manila newspaper.